Construction Methods

TECH. OLOG. DEPT.

AUTOMATIC TORCH splits steel tubing to be refabricated into large-diameter pipe for Springfield, Mass., water main.

MAY 1943

Contractor Plans Post-War Jobs • Navy's Seabees Build in Combat Area • Last Link in Trans-Canada Highway • Steel Pipe Cut, Rerolled and Welded into Larger Size • Practical Advice on Blasting

INLAND
Steel Sheet Piling

•

Wide range of sections

•

Special analysis for extreme strength

•

Free driving, yet water-tight under pressure

•

Corrosion resistant

ARMY E NAVY

INLAND STEEL CO.
38 S. DEARBORN ST.
CHICAGO, ILL.

SALES OFFICES

MILWAUKEE DETROIT
ST. PAUL ST. LOUIS
KANSAS CITY

MAY, 1943

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330 West 42nd St., New York

Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

JOHN ABBINK, Publisher
ROBERT K. TOMLIN, Editor — A. E. PAXTON, Manager
Editorial Staff: Vincent B. Smith, Paul Wooton (Washington), N. A. Bowers (San Francisco), Nelle Fitzgerald

A McGRAW-HILL PUBLICATION

CURRENT JOBS

.... and Who's Doing Them

BUILDINGS

Public — Navy Department has awarded $2,122,000 contract for additional hospital facilities at Oakland, Calif., outlying field at Monterey, and Naval Air Station, Alameda, to **K. E. Parker,** of San Francisco. In Michigan, **Kuhne Simons Co.,** of Decatur, Ind., has dormitory housing contract for $1,967,059. **National Homes Corp.,** of La Fayette, Ind., submitted low bid of $1,936,080 on two-person family housing in Michigan. In Hawthorne, Nev., **William P. Neil Co., Ltd.,** of Los Angeles, is building additional facilities for the Navy for $3,203,300. **Cowan Construction Co.,** Shawnee, Okla., has Army contract for building appurtenances in Okmulgee Co., Okla., for under $2,000,000. In Tennessee, **O'Driscoll & Grove, Inc.,** of New York, has contract for Army housing in Roane Co. at $1,000,000-$3,000,000.

Industrial — Steam power plant addition in St. Paul, Minn., is being built by **F. J. Romer Construction Co.,** of St. Paul, for $4,000,000.

Commercial — In Charleston County, S. C., **Long Construction Co.,** of Charleston, is building 2,200 one- and two-story frame asbestos-siding dwellings for an estimated $7,000,000. In San Pablo, Calif., **Bohannan & Chamberlain,** of San Mateo, are building 700 five- and six-room frame residences, for an estimated $3,500,000. **Gross-Morton Corp.,** Jamaica, N. Y., are building 106 eight-family brick apartments in Stemmers Run, Md., for an estimated $2,000,000.

HEAVY CONSTRUCTION

Army and Pan-American Airways contract for improvements and general development in Brazil was awarded to **Foley Bros., Inc.** and **Spencer White & Prentis,** both of New York, at an estimated $28,000,000 plus. Navy contract for improvements at Pensacola, Fla., went to **Hardaway Contracting Co.,** of Columbus, Ga., for $14,090,950. In Glenview, Ill., Navy contract for additional facilities went to **Standard Paving Co., White Consolidated, Inc.** and **Midwest Construction and Asphalt Co.,** all of Chicago, for $1,534,300. Civil Aeronautics Administration has awarded $1,858,106 contract for improvements in Kenton Co., Ky., to **Frank Mashuda Co.,** of Milwaukee. Mining pit development in Minnesota, is being done by **Winston Bros. Co.,** of Minneapolis, and diversion of Embarrass River by **J. A. Terteling & Sons,** Boise, Idaho, for an estimated $3,000,000. Army contract for improvements and additional buildings in Buffalo Co., Neb., was awarded to **Peter Kiewit Sons Co.,** of Omaha and **Bighorn Construction Co.,** of Sheridan, Wyo., for $500,000 to $1,000,000. **Mt. Vernon Contracting Corp.,** Mt. Vernon, N. Y., holds Army contract for drainage and paving in Orange Co., N. Y., to exceed $2,000,000. **H. Kaplan Co.,** of Chicago, has been awarded Army contract for improvements in Richland Co., Ohio, at estimated total of $7,000,000. In Oklahoma, **Texas Bitulithic Co.,** of Dallas, Texas, has been awarded $1,000,000 — $5,000,000 Army contract for improvements in Carter Co. Improvements in Green Co., Ohio, for the Army are being made by **M. J. Boyle & Co.,** of Chicago, for over $2,000,000. Improvements contract for Civil Aeronautics Administration in Newport, Ore., for $1,495,932 was given to **Strong & McDonald** and **White Bros.,** of Tacoma, Wash.

HIGHWAYS AND BRIDGES

Among recent highway contract awards are the following: Florida: $1,396,916 to **Groves, Lundin & Cox Co.,** of Minneapolis. Michigan: less than $1,000,000 to **Colaid Service Corp.,** Detroit, and less than $1,000,000 to **Denton Construction Co.,** Detroit. Nebraska: $500,000 to $1,000,000 to **Lowe Construction Co.,** Cedar Rapids, Ia. Ohio: $1,299,183 to **The Horvitz Co.,** of Cleveland. Pennsylvania: $1,115,511 to **Francis A. Canuso & Son,** of Philadelphia; and $1,172,714 to **S. J. Groves & Sons Co.,** of Ridgefield, N. J., and low bid of $1,098,699 from **National Structures Corp.,** of New York. Tennessee: $618,164 to **A. B. Long,** Harriman.

The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How **40-TON WELDED ASSEMBLIES** were prefabricated at six-way shipyard. —p. 45
How **STEEL PLATE AT SHIPYARD** was cut accurately by travograph guiding cutting torch. —p. 45
How **REFABRICATION METHODS** converted steel tubing into large-diameter pipe. —p. 49
How **PIPE WAS SPLIT** by oxyacetylene torch prior to refabrication into larger sizes. —p. 50
How **AUTOMATIC WELDING MACHINE** produced large pipe from smaller steel tubing. —p. 53
How **POST-WAR JOBS** are being planned and developed by large construction company. —p. 54
How **PORTABLE RUNWAY OF WIRE MESH,** reinforced with steel rods, was used for emergency aircraft landing runways. —p. 57
How **EFFECTIVE BLASTING** can be done by following tips of explosive specialist. —p. 58
How **UNDERWATER BLASTING** was done by charging dynamite through pipe from barge. —p. 58
How **CORE PUNCH BARS** facilitated blasting in wet soil. —p. 59
How **ALL-WOOD CONSTRUCTION** saved tons of steel in building ammunition igloos. —p 61
How **SUBAQUEOUS PIPE LINE** was laid with aid of curved launching cradle. —p. 62
How **TAR COAT AND ASBESTOS WRAPPING** was applied to protect 24-in. steel oil pipe line. —p. 62
How **METAL FOOT GUARD** protected from injury feet of pneumatic hammer operators. —p. 62
How **UTILITY POLES** 75 ft. long were loaded on trucks with use of skids and dolly. —p. 63
How **CIRCULAR GROOVES** are cut in lumber with air-operated drill to receive split rim connectors. —p. 63
How **MUSKEG WAS REMOVED** from Canadian roadbed by blasting and scraping. —p. 66
How **DEEP GIRDERS WERE FABRICATED** by arc-welding web plates into split eye beams. —p. 67
How **NAVY'S SEABEES** constructed island base in Southwest Pacific combat area. —p. 68
How **ELECTRIC EYE** controlled vehicular traffic through single-lane tunnel. —p. 71

CONSTRUCTION METHODS, May, 1943. Volume 25. Number 5. Published Monthly, price 20¢ a copy. **Return Postage Guaranteed.** Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42nd Street, New York, N. Y. **Subscription rates**—United States, Mexico and Central and South American countries, $1.00 a year, $1.50 for two years, $2.00 for three years. Canada, $1.50 a year, $2.50 for two years, $3.00 for three years. Great Britain and British Possessions 12 shillings a year, 36 shillings for three years. All other countries $2.00 a year, $6.00 for three years. Entered (or reentered) as second class matter December 16, 1936, at the Post Office at New York, N. Y., U. S. A. under the act of March 3rd, 1879. Printed in U. S. A. Cable address: "McGrawhill, New York." Member of A. B. P. Member of A. B. C. Contents copyrighted 1943 by McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York, N. Y.

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

JAMES H. McGRAW, Founder and Honorary Chairman

Editorial and Publishing Offices: 330 West 42nd St., New York; 520 North Michigan Ave., Chicago; 68 Post St., San Francisco; Aldwych House, London, W. C. 2, England. Branch Offices: Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Los Angeles; Atlanta, Ga.

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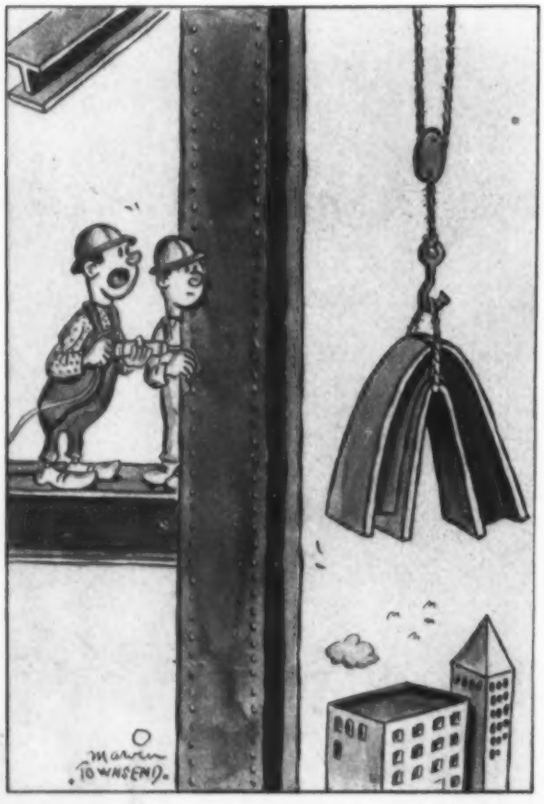
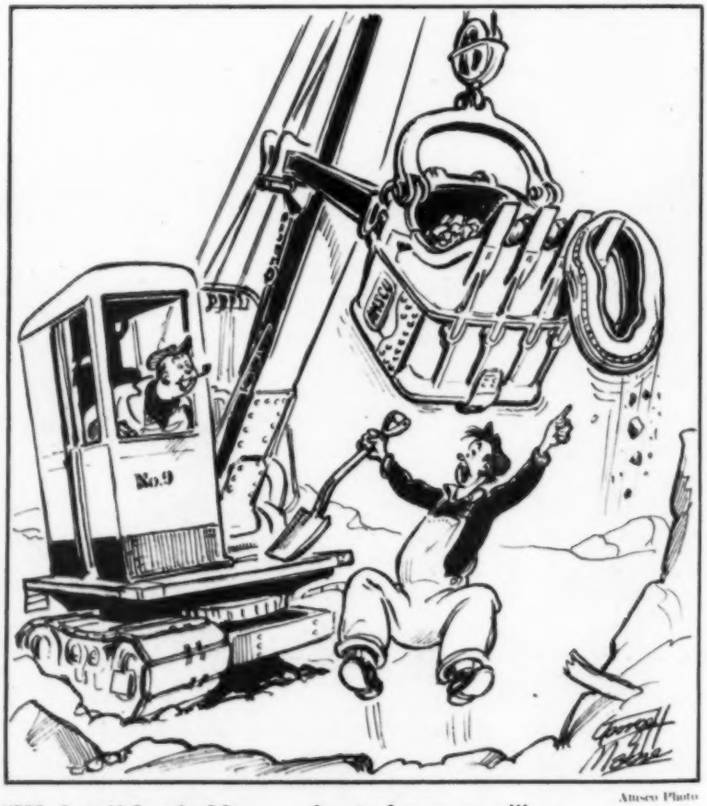
THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS

"Somebody's going to get his face slapped if he doesn't keep his big hooks away from me!"

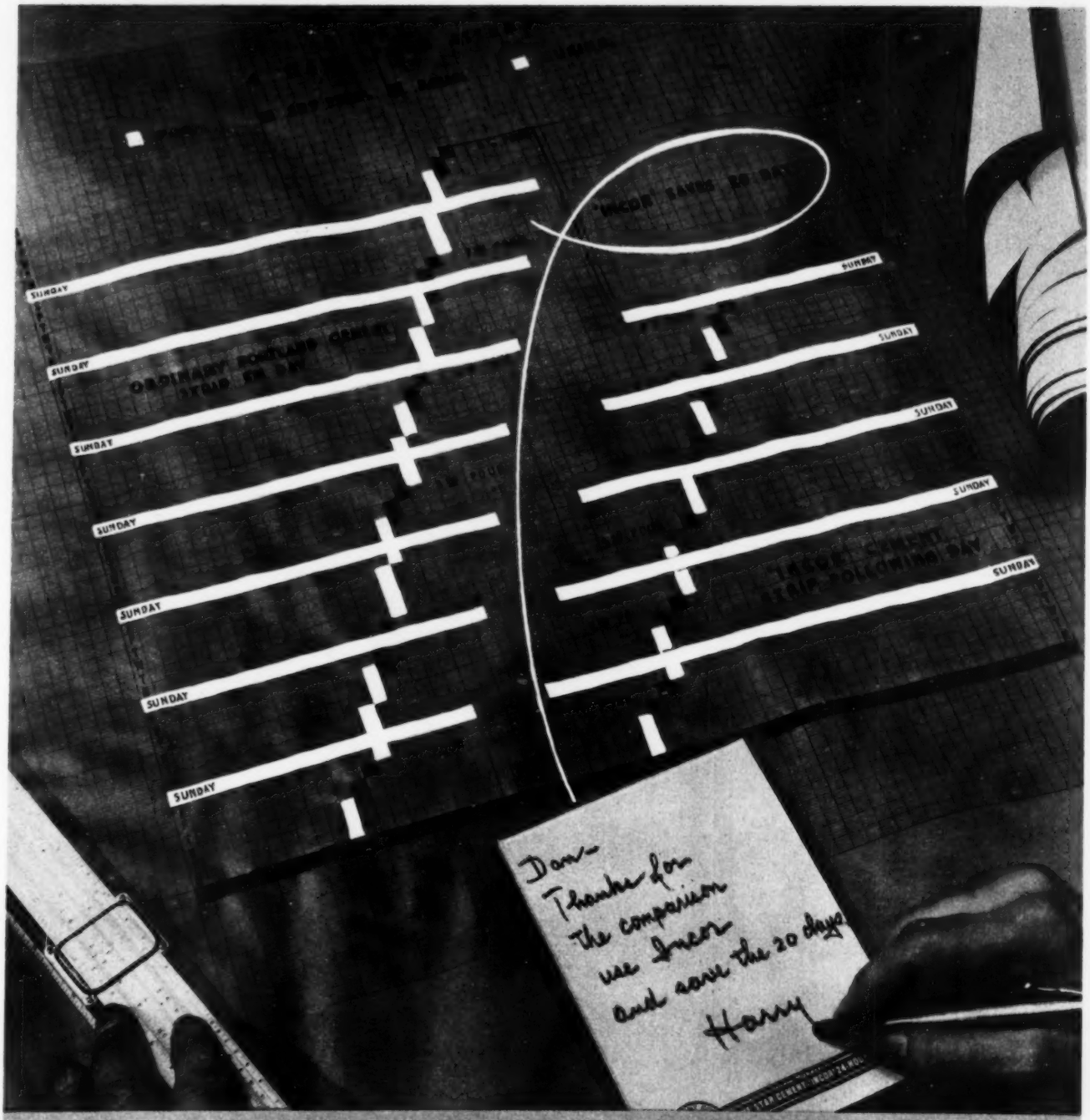


"They must've forgot to put Vitamin D in that one!"



"Wahoo!! Look, Mac . . . buried treasure!"

Ahrens Photo



TIME COSTS MONEY . . . 'INCOR' SAVES *BOTH.* Above is a typical erection-schedule comparison. Note the 20-day 'Incor' saving. It pays to estimate each job with both Lone Star Cement and 'Incor' 24-Hour Cement. With 'Incor', you strip clear in 24 hours . . . no reposting to interfere with follow-up operations. Faster schedules cut form costs 50% to 60%. 'Incor' concrete, poured today, is in use tomorrow . . . better use of every man-hour . . . maximum construction efficiency. Time costs money . . . use 'Incor'* and save both.

*Reg. U. S. Pat. Off.

LONE STAR CEMENT CORPORATION

Offices: ALBANY • BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON • INDIANAPOLIS • JACKSON, MISS.
KANSAS CITY • NEW ORLEANS • NEW YORK • NORFOLK • PHILADELPHIA • ST. LOUIS • WASHINGTON, D. C.

GENERAL

recommends the continued purchase of War Bonds and Stamps—and the observance of preventive maintenance to keep your machinery running.

GENERAL SUPERCRANE!

Why Super? Because it is Better! - - - Because it requires but one operator, and has but one engine - - - yet is mounted on rubber tires, steers hydraulically, moves without tracks or overhead connections - - - goes most anywhere. The SUPERCRANE handles more material faster, easier, and for less cost.

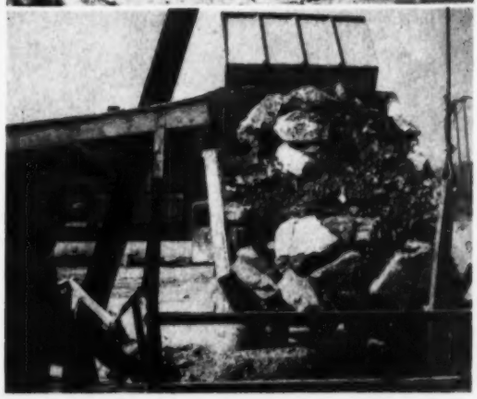
GENERAL GIVES YOU MORE!

The OSGOOD COMPANY
Sizes: ¾ to 2½ Cu. Yd.
Diesel - Oil - Gas - Electric
Associated with The GENERAL EXCAVATOR CO.

The HERCULES COMPANY
HERCULES *IRONEROLLERS*
6 to 12 Tons
Diesel or Gasoline
Associated with The GENERAL EXCAVATOR CO.

GENERAL
Sizes: ⅜-½-⅝-¾ Cu. Yd.
Diesel—Gas—Electric
SHOVELS
DRAGLINES - CRANES
Crawler & Wheel Mounted
THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

STEPPING UP PRODUCTION WITH *Euclids*



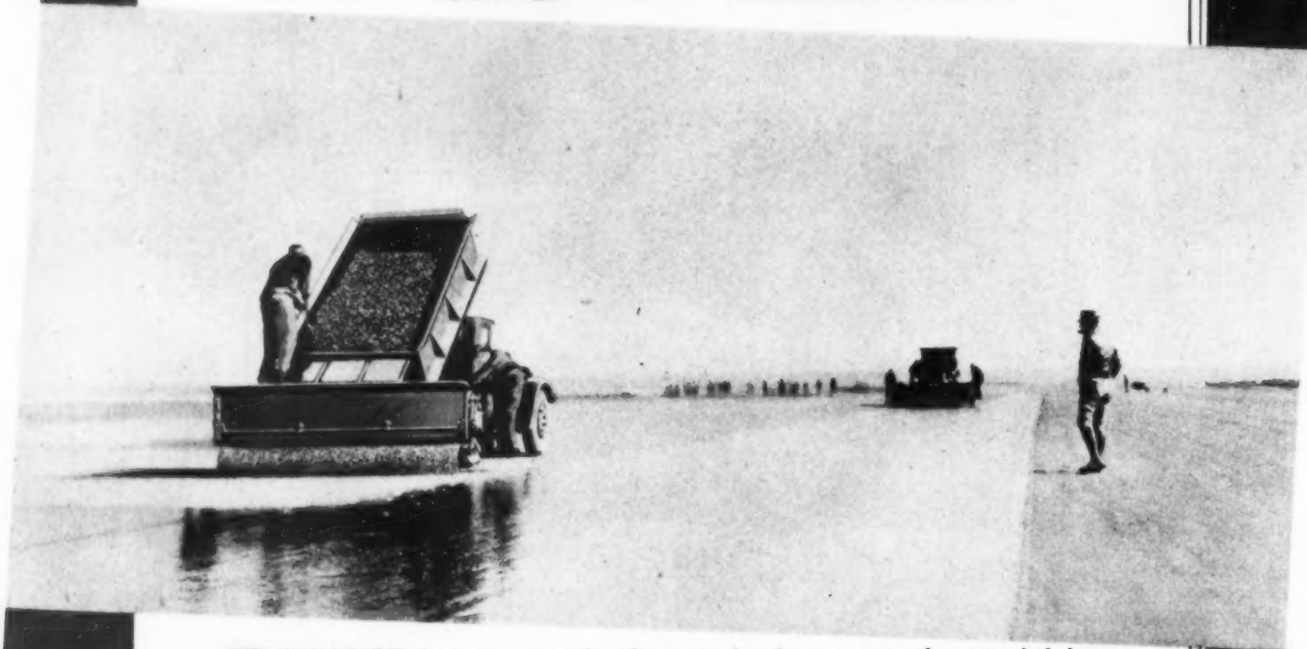
● Increasing production, or even maintaining present levels, is a tough problem these days when men and equipment are not readily available. Bottom-Dump and Rear-Dump Euclids are helping to solve production problems for many industrial and contractor owners because of their dependable performance on around the clock schedules.

The demands for Euclid equipment by the Army, Navy and other essential users may prevent you from obtaining the advantages of Euclid speed and capacity now, but we would like to plan with you for the time when priorities no longer restrict the sale and use of Euclids.

The EUCLID ROAD MACHINERY Co.
CLEVELAND, OHIO

EUCLID SELF-POWERED HAULING EQUIPMENT
EARTH · ROCK · COAL · ORE

NOTES
on AIRPORT CONSTRUCTION and MAINTENANCE: Buckeye Spreaders SAVE time AND materials



BECAUSE it puts exactly the required amount of material just where it's needed, the Buckeye Spreader eliminates wasted time and material. One pass and the course is laid *right*—no time lost patching thin spots, no material wasted.

High accuracy (users report as high as 98%) is but one feature of this versatile spreader; it handles everything from a fine sprinkle of sand to a 1½" layer of stone—or up to a 6" course with strike-off attachment.

Write now for performance-checked *facts* about this ideal airport construction and maintenance worker!

THE BUCKEYE TRACTION DITCHER COMPANY
Findlay • Ohio

Built by Buckeye

We Borrowed Their "Nylons" to Make Tires for the Navy

A typical example of B. F. Goodrich leadership in tires

THINGS are happening in the rubber industry.

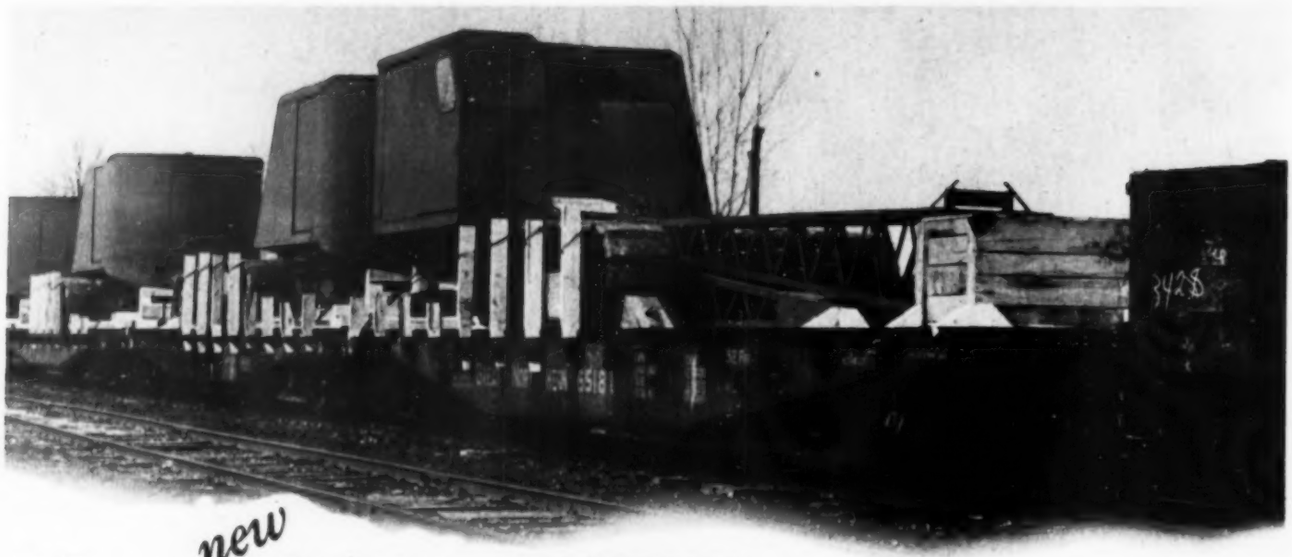
New ideas are being born which conserve rubber today—and will save you money tomorrow.

In the B. F. Goodrich laboratories they're trying out dozens and dozens of new methods of tire construction. For example, tires are being built with Nylon cord—as well as of cotton or rayon. Nylon has such great strength that it is possible to build tires with less rubber. Passenger car tires built with only two Nylon plies ran far longer than four-ply conventional type tires when tested for ply separation and overload!

And bruise resistance is so great in airplane tires made with Nylon cord that both the Army and Navy have placed orders for this new type tire that saves weight and makes landings safer. B. F. Goodrich was the first company to make and deliver such tires to the U. S. Navy.

So the Nylon your wife is *not* getting in the form of hose is going to war. Some of it is being used in experimental work that may save thousands of tons of rubber. Perhaps one day you may be able to buy B. F. Goodrich Silvertowns for trucks with eight plies instead of twelve, that with weight reduced considerably will run cooler at high speeds—all because of today's wartime developments. *Maybe*, we say. For there are still many problems to be solved.

We do know that when this war is over B. F. Goodrich will offer you far better tires than ever built before Pearl Harbor. Whether they are built with Nylon, rayon, or cotton cord, with crude or synthetic rubber, B. F. Goodrich will be *first* with the new mileage-saving, money-saving developments. In peace as in war, B. F. Goodrich will be "First in Rubber"



Your new BAY CITY equipment *GOES TO WAR!*

There is likely no need to remind contractors and operators that construction equipment *has gone to war* and that all purchases are now under WPB Limitation Order. BAY CITY convertible shovels, cranes and draglines are serving on many fronts, from the hot sands of Africa to the jungles of the Southwest Pacific. The many outstanding operating advantages, the easy control, the fast operating speeds, the fine balance and the quick convertibility that made BAY CITY your choice for peace-time construction – is now in the fight, helping to build the Road to Victory.

While the WAR Lasts

While the war lasts, BAY CITY equipment may be available *only* to the Armed services. It is important, then, that crane and shovel operators get complete maintenance and operating instructions from manufacturers and follow them carefully. Existing equipment, working at high-speed 3-shift schedules will last longer and continue to produce if common-sense-rules are followed. A few reminders are listed here: insure proper regular lubrication; provide daily inspection to detect little troubles; make adjustments when needed – don't wait; keep fuel, lubricants and radiator water clean; tighten loose bolts and nuts; plan work to favor machine; keep machine clean and painted; remove clutch and brake bands and clean lining with good grade of clear gasoline; always give manufacturer or distributor both model and serial number.

When the WAR Ends

When the war ends, you will likely need new, modern, improved shovels and cranes to meet competitive, low-cost bidding. You will then be able to get delivery from BAY CITY. If you have never had one of these fast, powerful machines on your job, you have missed the high performance and low operating costs that have always been associated with this equipment. Keep BAY CITY in mind for your post-war construction.

Illustrated here is the BAY CITY CraneMobile – 20 tons of lifting capacity on rubber, booms and jibs up to 105 feet, road speeds up to 30 mph, specially designed carrier for crane service. Maximum production on this unit is sold through June 1944. We will, however, be glad to send specifications so you will have complete details when they are needed – just ask for Catalog 18C.

BAY CITY SHOVELS, Inc., BAY CITY, MICH.

BAY CITY SHOVELS

BAY CITY

SHOVELS – CRANES – DRAGLINES – TRENCH HOES – SKIMMERS

MAKE FULL INSPECTION A REGULAR ROUTINE

...even if your rope is long-enduring

HAZARD LAY·SET *Preformed*

Both steel and production time are critical. Save both by regular inspection of your machines. Look especially to your wire ropes that operate them. Wire rope is expendable. Take care of it in order to receive its full service. And this applies to all ropes including **LAY-SET** Preformed, for while **LAY-SET** outlasts ordinary non-preformed wire rope, it too will respond to proper care by lasting *still* longer. Here are a few suggestions:

- Clean and lubricate all ropes regularly. Be sure hemp core is not dry or corrosion or collapse may occur. Tighten fittings.
- Be sure you are using the proper rope for the service. Consult your Hazard representative. He will be glad to give you the benefit of Hazard's 97 years of experience.
- If sheaves or drums are critical diameter, specify Hazard **LAY-SET** Preformed because of its high fatigue-resisting quality.
- Be careful of the fleet angle. Don't let the rope deviate more than 1½° from center plane of sheave or excessive wear will result. (Note how this condition is beginning to start in this picture.)
- Don't allow bad spooling for crushing may result. Hazard **LAY-SET** Preformed spools much better than most ropes.

HAZARD WIRE ROPE DIVISION, Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, INC., BRIDGEPORT, CONNECTICUT

HAZARD LAY·SET *Preformed* **WIRE ROPE**

POZZOLITH Concrete S

120 DAYS AGO . . .

This mammoth floor slab – – 800′ x 800′ – – was placed and finished at war speed with Pozzolith Concrete.

In floor construction Pozzolith produces maximum durability by having low water content . . . low cement paste factor . . . yet good mobility of mix plus good cohesiveness, and strength well above requirements.

Write for illustrated Pozzolith booklet and complete information on Cement Dispersion.

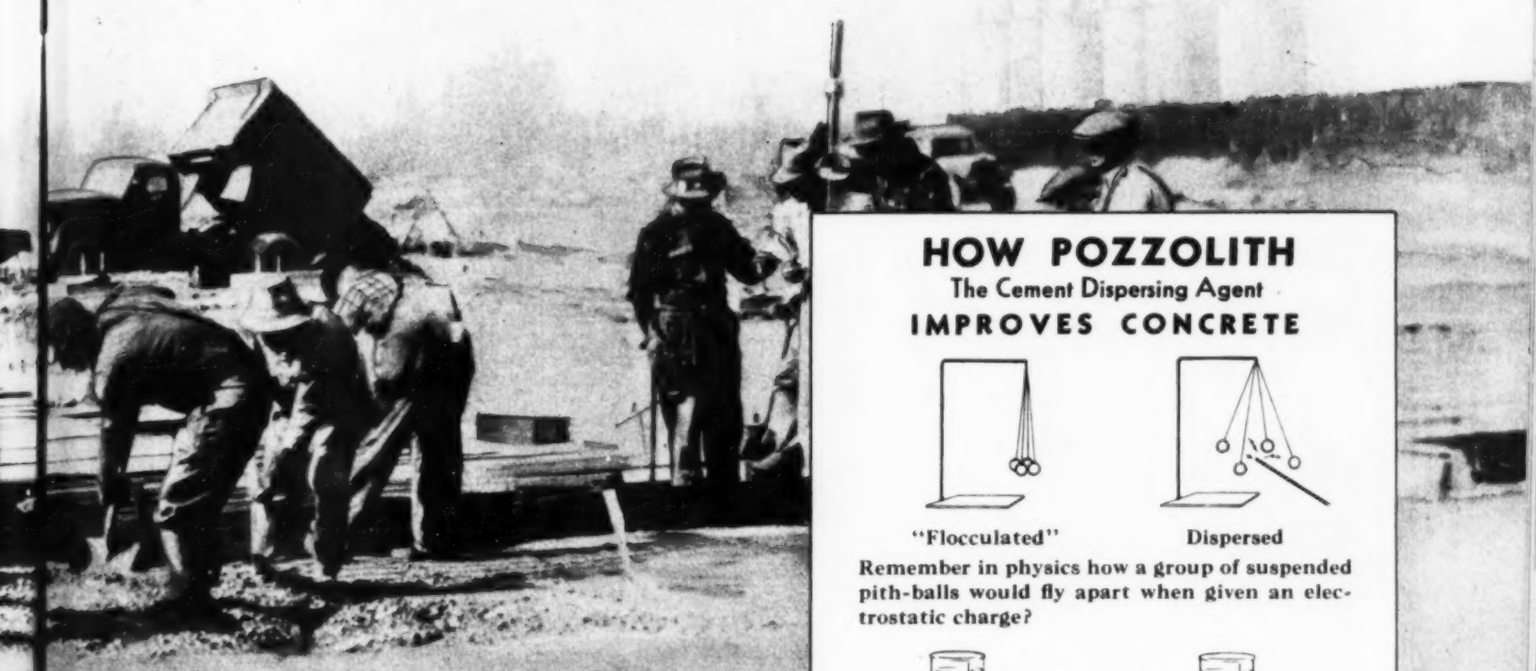
THE MASTER BUILDERS COMPANY

CLEVELAND, OHIO TORONTO, ONTARIO

MASTERBUILT PRODUCTS

MASTER

Speeds 15 Acres of Floor Slab



TODAY...

In tooling up – 40 ton machines skidded over this floor – did no damage to slab or surface, "it just gave it a polish" – practical evidence that Pozzolith Concrete can take it.

Speed – Durability – Economy . . . three reasons Pozzolith has been used in millions of cubic yards of concrete on war plant construction, including –

12 Shell Loading Plants	32 Factories
7 Aluminum Plants	3 Ship Yards
4 Small Arms Plants	17 Ordnance Plants
8 Giant Aircraft Plants	4 Army and Navy Bases

HOW POZZOLITH
The Cement Dispersing Agent
IMPROVES CONCRETE

"Flocculated" Dispersed

Remember in physics how a group of suspended pith-balls would fly apart when given an electrostatic charge?

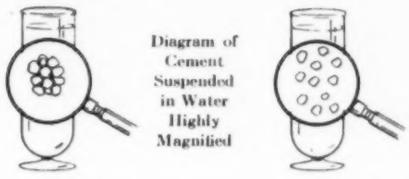


Diagram of Cement Suspended in Water Highly Magnified

Flocculated Dispersed

Similarly, cement particles which bunch together in water, or flocculate, are separated by this same electric force when Pozzolith is added to the mix. Thus greater cement surface area is made available to hydration, resulting in . . .

1. Putting more of the cement to work, by increasing the amount of hydration as much as 40%.
2. Increasing workability, producing up to 2½ times as much slump with the *same* amount of water.
3. Permitting up to 20% reduction in water, maintaining placeability . . . increasing strength . . . watertightness . . . and durability.

BUILDERS

MASTERBUILT PRODUCTS

ARMORED in PLASTIC

THIS NEW ¼" PORTABLE ELECTRIC DRILL IS 14% LIGHTER . . . HAS MORE POWER PER POUND!

14 percent lighter in weight, more powerful per pound, cooler to handle, and far safer, the new Thor "Armored in Plastic" ¼ inch portable electric drill brings remarkable new speed and operating ease to every war production drilling job.

The "Armored in Plastic" construction of this Thor drill is unique, for the tough, new, specially developed "Thorite" plastic does not support any operating parts, but serves only as a protective armor. In fact, the drill will operate perfectly with the plastic armor entirely removed!

The new Thor "Armored in Plastic" drill is available *now* to war industries. For full information send the coupon.

Advantages of the Thor U14K That Speed Production and Assure Long Service Life

MORE POWER PER POUND—Over-capacity, high-torque Thor AC-DC motor provides heavy-duty drilling power in light weight tool for continuous production service.

14% LIGHTER WEIGHT—Housing of tough, light "Thorite" plastic; skeleton motor-and-gear-frame of strong, light aluminum permits compact, weight-saving design without sacrifice of motor size or power. Only 3¼ lbs., the heavy-duty Thor U14K is 14% lighter than comparably-rated, old-style machines.

NEW HANDLING COMFORT—Smooth contours and "natural-fit" grip make the U14K comfortable to handle for continuous working. Perfect balance and light weight permits "finger-point" drilling accuracy with easy, one-hand operation.

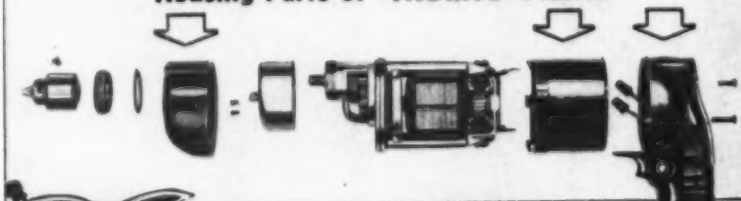
COOL-RUNNING—Oversize fan and ample intake and exhaust slots circulate generous volumes of air through tool to make it extremely cool running. Heat-resisting "Thorite" plastic housing stays cool in the hand.

GREATER SAFETY—"Thorite" plastic — a non-conductor — is added protection against shock. Three-conductor cable with ground wire and neoprene-sealed switch are other Underwriter Approved features

This Skeleton Frame is Secret Of Its Amazing Strength

This sturdy metal frame supports all internal operating parts of the Thor plastic drill, insuring close tolerance and permanent alignment of all parts. The plastic housing does *not* support any working parts, but serves only as a protective armor.

Housing Parts of "THORITE" Plastic:



ARMY-E-NAVY
THOR'S 50th YEAR

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD, CHICAGO, ILL.

Branches in Principal Cities

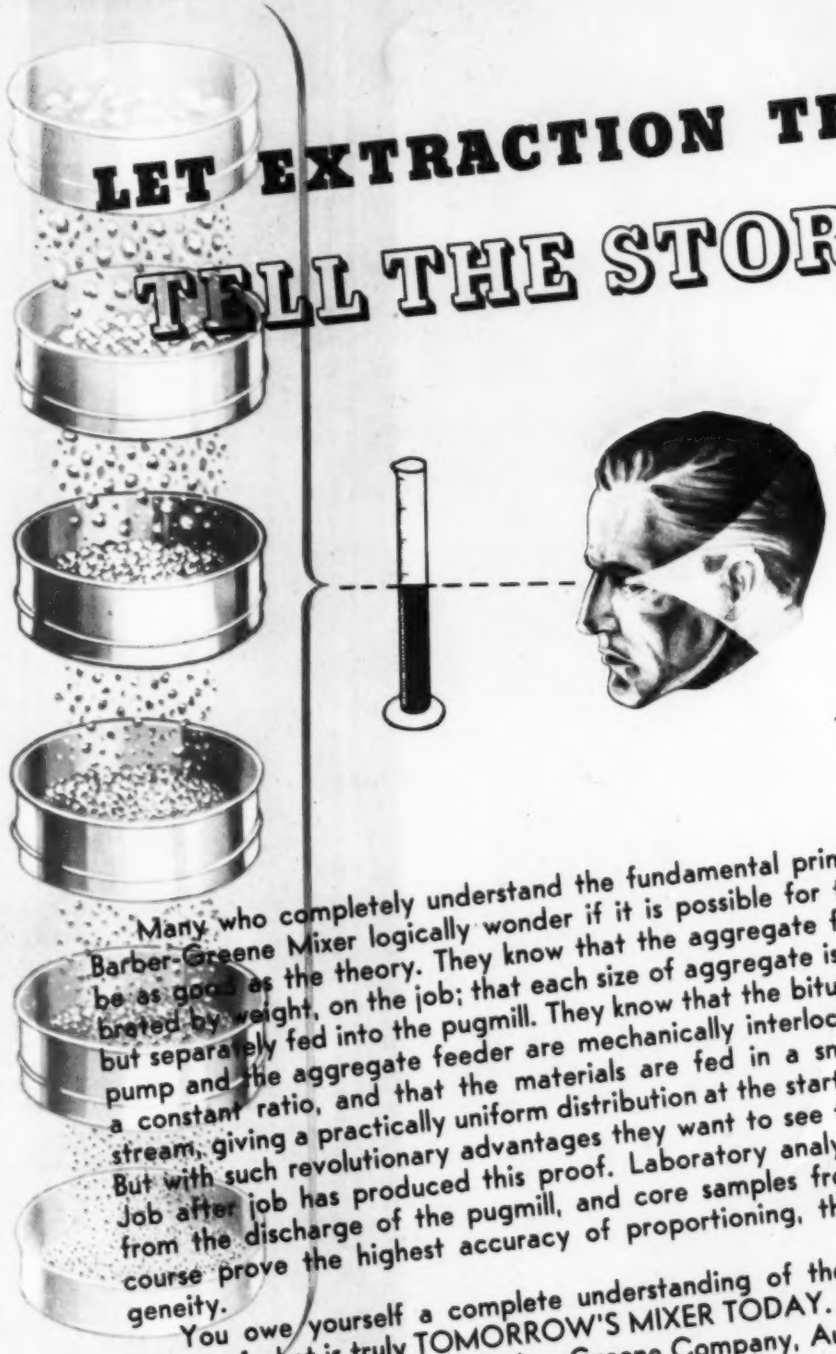
ADDITIONAL INFORMATION

Independent Pneumatic Tool Co.
600 W. Jackson Blvd., Chicago, Ill.

Please send full engineering data on the new Thor "Plastic" Drill.

Name .....
Title .....
Company .....
Address .....
City ..... State .....

LET EXTRACTION TESTS TELL THE STORY



ACCURATE GRADATION

ACCURATE PROPORTIONING

THOROUGH MIXING

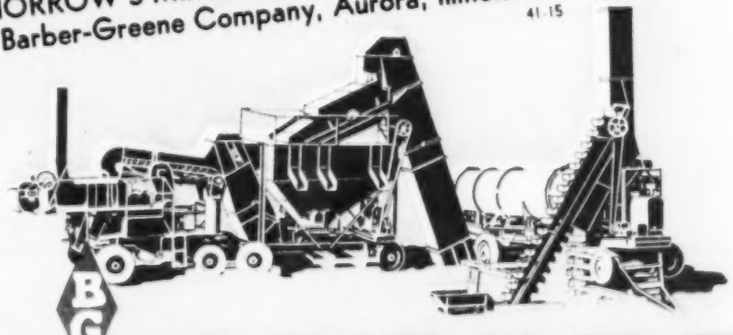
CONSISTENT PERFORMANCE

SIMPLE INSPECTION

Many who completely understand the fundamental principles of the Barber-Greene Mixer logically wonder if it is possible for the results to be as good as the theory. They know that the aggregate feeder is calibrated by weight, on the job; that each size of aggregate is continuously, but separately fed into the pugmill. They know that the bitumen metering pump and the aggregate feeder are mechanically interlocked to deliver a constant ratio, and that the materials are fed in a small continuous stream, giving a practically uniform distribution at the start of the mixing. But with such revolutionary advantages they want to see the final proof. Job after job has produced this proof. Laboratory analyses of samples from the discharge of the pugmill, and core samples from the finished course prove the highest accuracy of proportioning, the finest homogeneity.

You owe yourself a complete understanding of the principles and *results* of what is truly TOMORROW'S MIXER TODAY. Write for literature, there is no obligation. Barber-Greene Company, Aurora, Illinois.

41-15



BARBER-GREENE

STRIKING POWER abroad needs productive power at home. To keep productive machine hours up and overhaul lay-offs down in the *CONSTRUCTION* field use

. . . SINCLAIR SPECIALIZED OILS and GREASES. These products give equipment *correct* lubrication that keeps wear negligible in the most punishing service.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

PART *of equipment of C. S. Foreman Company working on Federal pipe line project "Somewhere in Missouri." All equipment used on a 68-mile section was lubricated with Sinclair products.*

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

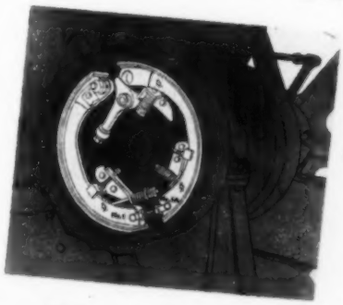
2540 West Cermak Road, Chicago • 10 West 51st Street, New York City • Rialto Bldg., Kansas City • 573 West Peachtree Street, Atlanta • Fair Building, Ft. Worth

P&H

GET LONGER SERVICE

BY INTERCHANGING CLUTCH SHOES . . .

Get every ounce of service you can for the duration. For the same reason you rotate the tires on your car, interchange clutch shoes on your excavators to make *them* last longer. Avoid replacements — save money — conserve materials — prevent delays.



We've made it easy for you with a new bulletin that shows exactly how to do it. Clear instructions, along with a detailed diagram of the P&H two-shoe, self-energizing clutches, indicate how to interchange shoes in the shortest possible time.

Make War on Wear with Proper Care

P&H owners and operators are urged to send for this new folder, "How to Interchange Clutch Shoes for Longer Wear" (Folder No. D-50).

These P&H advantages are already helping to keep wartime maintenance to a minimum:

WELDED ROLLED STEEL CONSTRUCTION assures extra toughness and rigidity.

TRUE TRACTOR-TYPE CRAWLERS put an end to old crawler troubles.

P&H HYDRAULIC CONTROL — easier on both machine and operator.

ARMY E NAVY

A new star has been added to P&H's award for excellence in war production.

General Offices:

4494 W. National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER CORPORATION

EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H HOISTS · WELDING ELECTRODES · MOTORS

A New Flag Flies Over Union Metal Today

THERE'S a fresh look of determination in the eyes of the men and women of Union Metal today—a look that is accompanied by a greater hum of activity than we have ever heard around here before. For, outside our plant, flying high for all to see, is the coveted Army-Navy E Pennant.

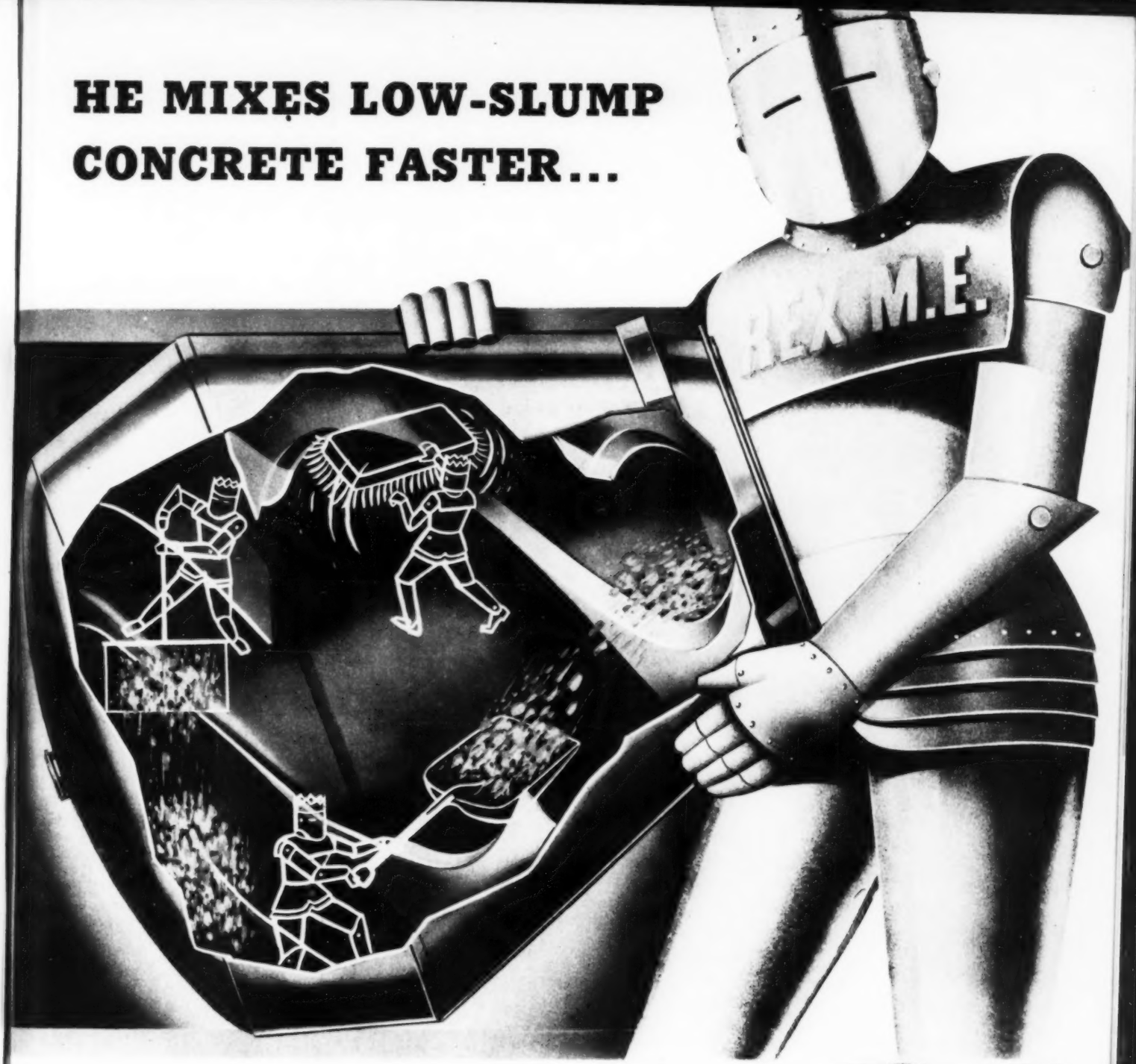
That new flag has done something to all of us—something we can't quite explain, but which certainly augurs no good for America's enemies. And, from here on in, we pledge to do our best to *continue* to merit this great honor which the armed forces have conferred upon us, and to give to them the fullest support, both moral and material, of which we are capable.

Special War Products—Cargo Booms and Masts, Practice Bombs, Recoil Mechanisms, Gun Mounts.

Regular Products—Steel Street Lighting Standards, Monotube Steel Pile Casings, Steel Skids and Boxes, Monotube Steel Poles for distribution and transmission lines.

THE UNION METAL MANUFACTURING COMPANY
CANTON, OHIO
Craftsmen in Steel Fabrication

HE MIXES LOW-SLUMP CONCRETE FASTER...



HIGH-DISCHARGE truck-mixing was a troublesome problem child for civil engineers and contractors not very long ago. Discharge was slow; the drum and blades wouldn't scour; the mixing actions balked at handling low-slump concrete.

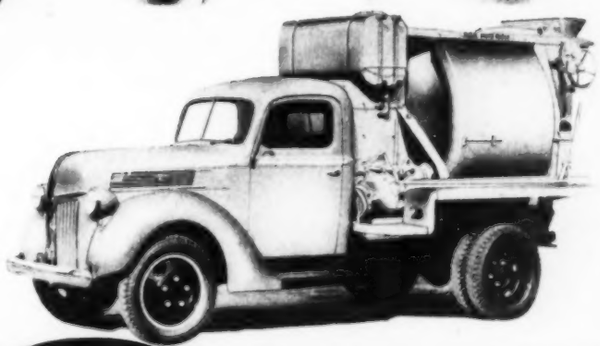
Rex Mechanical Engineering—Rex M. E.—found the answer for all in a blading design which makes the mixing action go uphill, *in the discharge direction.*

This is of extreme importance in the early stages of all concrete mixing, as otherwise the main mass tends to rotate with the drum, and the mixing is delayed.

The Rex mixing action makes discharge faster. The drum and blades are self-cleaning—scoured from end to end. There is no pocketing, no bulking, no building up of concrete.

Mixing dry or low-slump concrete is speeded up as much as 50 to 100%.

It is one of many inventions that Rex Mechanical Engineering—Rex M. E.—has provided in machines for mixing concrete, placing concrete and for removing water at maximal efficiency and minimal cost and waste.



REX **CONSTRUCTION MACHINERY**

Concrete Mixers • Moto-Mixers • Pavers • Mortar and Plaster Mixers • Speed Prime Pumps • Pumpcretes

CHAIN BELT COMPANY OF MILWAUKEE

A $10 Word *that gets down to Brass Tacks*

No, synergism is not a new word. It is an old word, with the basic meaning—"forces working together to produce a whole greater than the sum of the parts." Lately it has developed an industrial connotation of "minds stimulating each other to create more than the sum total of the ideas expressed."

SYNERGISTIC thinking is the next step beyond co-operation—the creative step that evolves better methods, more effective processes, new materials, faster production, finer products. It has worked miracles in war production.

But synergism is not confined to huge achievement. On the contrary, synergistic thinking is responsible for the little creations that pave the way for bigger accomplishment. Wherever you find minds stimulating each other to action, there you will find progressive steps—big or little.

Sometimes it takes the form of a crude, but functioning apparatus—a rough sketch—an immature product. It is as likely to be the brain-child of skilled workmen as of Ph.D's. Perhaps it developed from a discussion across a desk or around a machine. But always it represents the impact of minds "clicking" together for a practical creative result.

Industry—from top to bottom—is learning that synergism speeds progress, raises standards. The war is a good teacher. Here at Atlas, we have practiced synergism in our spheres of chemical production to gain some notable results in collaboration with our customers. We would like to show you what synergistic thinking may accomplish for any problems of yours that may lie within our scope.

ATLAS POWDER COMPANY
WILMINGTON, DELAWARE
Offices in Principal Cities

Industrial Explosives • Industrial Finishes • Coated Fabrics • Acids
Activated Carbons • Industrial Chemicals • Ordnance Materiel

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Keeping in the PINK OF CONDITION

• • • And How!

KEEPING 'EM on the job and in top-rate operating condition—that's the purpose of this new 24-page handbook for Lorain owners and operators. It tells you how to renovate worn parts so they can be re-used efficiently; how to substitute for critical materials when making emergency repairs; how to do more with what you've got.

Hundreds of operators have found that the Fix-It Handbook can save them time, trouble and money. If you haven't received a copy, clip and mail the coupon below.

THEW-LORAIN

CRANES • SHOVELS

DRAGLINES • MOTO-CRANES

THE THEW SHOVEL CO., Lorain, Ohio

Please send me a copy of the Thew Fix-It Handbook. If you would also like to receive a colorful, 5" red, white and blue Conservation Emblem for shovel, crane, tractor, bulldozer or truck, check here_____

PLEDGED CONSTRUCTION EQUIPMENT CONSERVATION

Signed _____

Lorain Model No. _____ Serial No. _____

Street Address _____

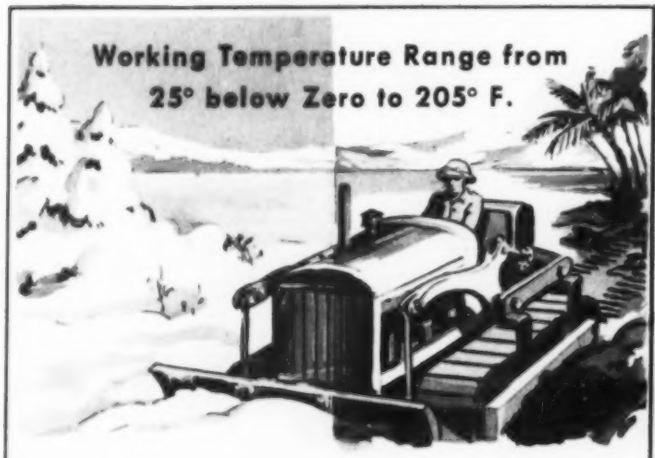
City _____ State _____

HERE'S A GREASE THAT CAN "TAKE IT"

Come Hell or High Water!

For Tractors, Shovels, Trenchers, Graders, Scrapers, Alemite #33 Takes Punishment, Saves Machines!

Working Temperature Range from 25° below Zero to 205° F.



With that range of effectiveness, you can know every bearing is getting full protection, whether your machines are working in midwinter or under a sun hot enough to fry an egg! And all the time Alemite No. 33 is sealing every fitting against grit and dust penetration—an extra safety factor for vital bearings!

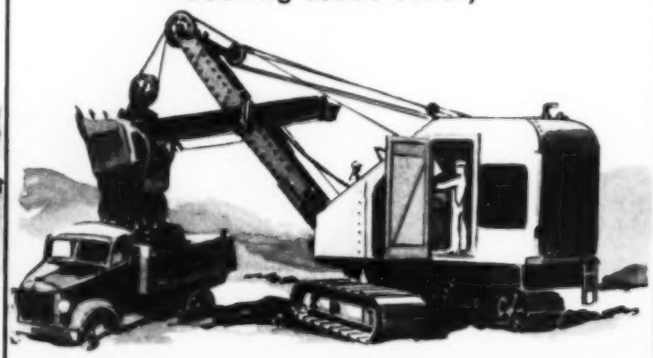
Can't Clog Grease Guns or Bearing Lubricant Grooves

Alemite No. 33 is compounded to exacting specifications which prevent separating, oxidizing, or hardening—permanent assurance that it won't clog high pressure guns or lubricant grooves. Neither will it pit or corrode highly polished bearing surfaces. That's why it actually lengthens the life of your machines.

Water-Repellent—Stands Up Under Exposure to Rain or Muck

Exposure to excessive moisture has no effect on the lubricating efficiency of Alemite No. 33. It is water-repellent, and does its job dependably even when exposed to rain, mud, or muck. What's more, intervals between lubrication can be lengthened, because this better grease lubricates longer.

Tough Film Endures Tremendous Bearing Loads Safely



Alemite No. 33 has an exceptionally tough film which enables it to stand up under tremendous bearing loads. Its exceptionally high film strength means positive protection against metal-to-metal contact in any bearing—protection which spells longer life, more dependable performance and lower maintenance costs.

For complete facts about many specialized Alemite Lubricants for construction machinery, write for the FREE "Alemite Industrial Lubrication Manual."

Another Product of STEWART WARNER

ALEMITE

REG. U.S. PAT. OFF.

Industrial LUBRICATION

Ask Anyone in Industry!

1840 Diversey Parkway, Chicago, Illinois • Belleville, Ontario

Keep Your *Hydraulic* Blade Equipment
DIGGING TO WIN!

Bucyrus-Erie
HYDRAULIC BULLGRADERS & BULLDOZERS

With new equipment reserved for our armed forces and existing equipment called on to take the punishment of wartime, highspeed 3-shift service, we've all got to pitch in and do a maintenance job as never before. Here are a few special hints that will prolong the useful life of your hydraulic Bullgraders and Bulldozers and keep 'em producing at top speed:

1. Watch the cutting edge and don't allow it to wear down to where the supporting casting is damaged.

2. Cutting edge can be reversed to give longer service when front edge is worn.

3. Keep the corner bits built up and hard-faced.

4. Don't allow pins to wear down too far before replacing or building up.

5. Inspect the blade and frame regularly for fatigue cracks, and weld them before they become serious.

6. Checking the hydraulic system should be regular routine. Be sure that oil is up to level and system is clear of air. A jerky, noisy machine is air-bound; a smooth one is free of air.

7. Drain the oil when it is dirty. Floating particles wear the pump and valve.

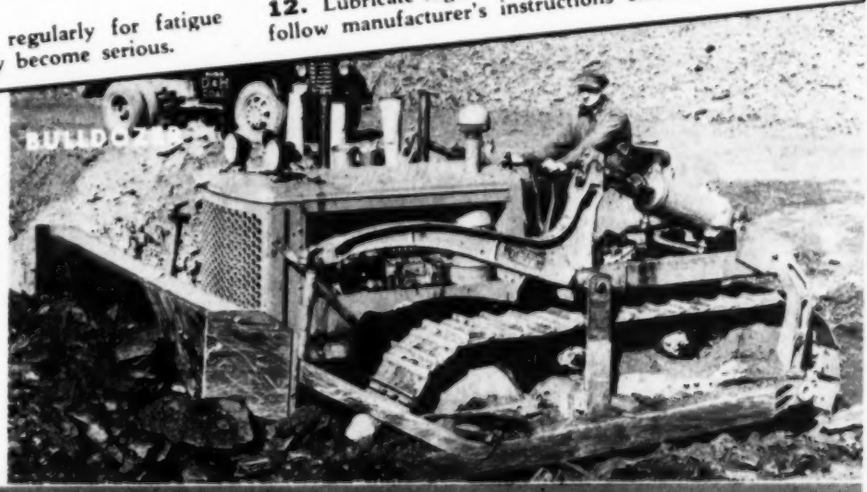
8. Keep all hose and pipe connections tight to prevent loss of oil and infiltration of air.

9. Inspect hydraulic hose to be sure it won't chafe and isn't twisted.

10. Keep bolts tight and all parts of the machine adjusted correctly.

11. Clean off dried mud or caked grease and maintain paint surfaces on all parts not subject to abrasion or moving contact.

12. Lubricate regularly. Use good grade lubricants and follow manufacturer's instructions carefully.



•

Your International Trac-TracTor Distributor will gladly advise you regarding proper maintenance and lubrication.

•

BUCYRUS ERIE TRACTOR EQUIPMENT

SEE YOUR INTERNATIONAL TRACTRACTOR DISTRIBUTOR

4 WAYS to get more service from WIRE ROPE

Yes, wire rope is tough. It can stand up to the most rigorous service—and ask for more.

But that's no reason to abuse it. With a little care, by applying a few simple rules, you can get a tremendous amount of extra service from your rope.

1 Break it in with light loads

For example, when breaking in a new rope, don't slam on full power and speed right off the bat. Begin with fairly light loads. Operate at moderate speed. Give the strands of the rope a chance to seat down snugly and uniformly upon the core, so that each strand is carrying its fair share of the load. This way, the rope will assume its proper "constructional stretch" without damage, and you'll be assured of better spooling and easier handling throughout the entire life of the rope.

2 Treat it with consideration

After the rope is broken in, you can safely use whatever speeds and loads it was designed for. But don't be unnecessarily rough, even then. A smooth, gradual application of power is just as efficient as slamming into the load with a jerk. The same is true of braking. It's the heavy jerks and surge loads that beat the guts out of a piece of rope. Nine times out of ten these can be avoided without losing time.

3 Know your rope

For example, if you're using a flexible 8-strand rope for high-speed work, don't overload it. This rope is built to withstand bending fatigue and fast operation—not for heavy hogging lifts. The opposite is true of heavy-duty 6-strand rope. Lift with it—but don't try to break speed records.

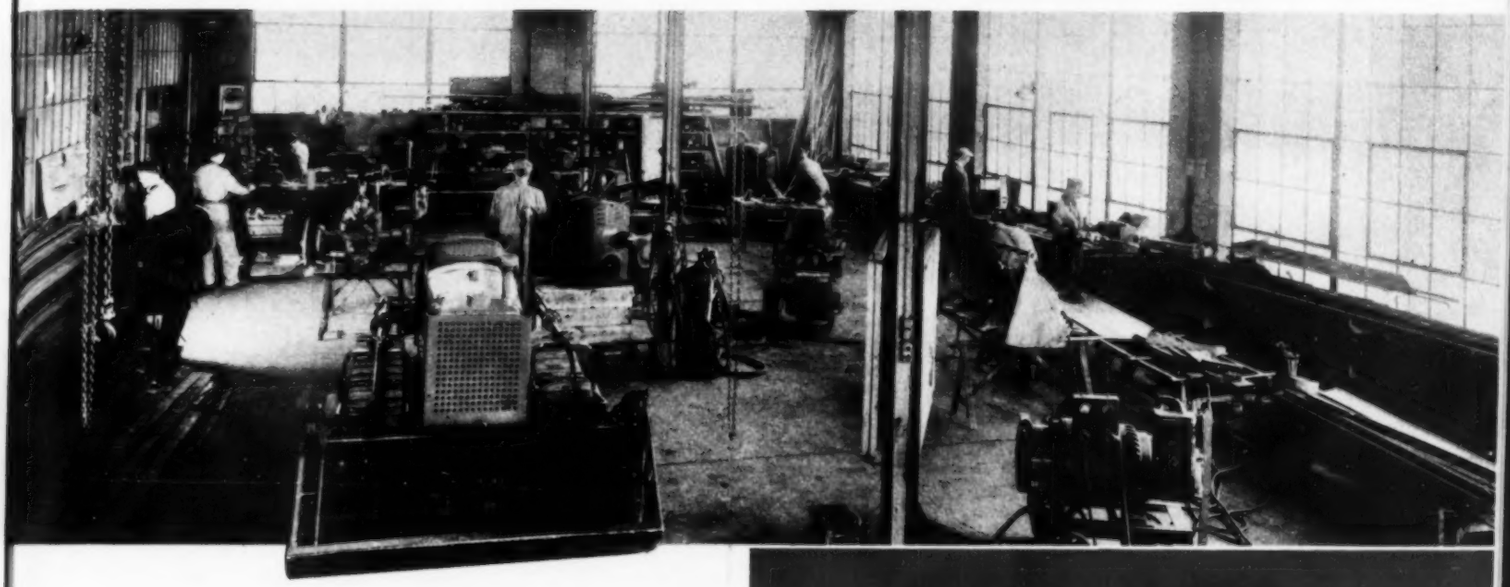
4 Right maintenance means plus service

Don't neglect the few simple maintenance precautions which require so little time yet return so much in extra service. Keep your rope properly lubricated. Don't operate it over sheaves that are abraded, damaged, or out of line. Fasten clips in the approved manner. Cut off a short length from the drum end of your rope from time to time so that "grief spots" are relocated over sheaves and drums.

Wire rope is now a war weapon. Its proper use is a service to your country and to yourself. If you want good, dependable rope, and friendly service, get in touch with the Bethlehem Wire Rope distributor in your territory. He's always ready and willing to serve you.

Bethlehem Manufactures Wire Rope for all Purposes

Stop TROUBLE
BEFORE IT STARTS!



With factory-trained mechanics, the right-type tools and labor-saving machines, your Allis-Chalmers dealer services your equipment quickly and economically.

Your tractors are built for the toughest kind of service . . . and they will stand up under the most severe punishment . . . but various parts will naturally wear with time. Take care of this wear promptly and you will ward off trouble. The quickest and most economical way is to have your Allis-Chalmers dealer build-up the worn parts or adjust them to shift the wear. This eliminates replacement cost, does away with waiting for parts and gives you a more efficient-operating tractor in the meantime — also saves you a major repair bill in case the worn part gives way and damages the surrounding mechanism. In addition, you help your country conserve on sorely needed materials.

Follow the Preventive Maintenance suggestions of your Allis-Chalmers dealer. They are proven ways of saving money and extending the life of your tractors. He is fully equipped to give you A-1 service . . . reliable help and advice. Get in touch with him NOW! Stop trouble before it starts!

ARMY E NAVY

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE, U. S. A.

WARTIME SERVICE FROM YOUR ALLIS-CHALMERS DEALER

1. **PARTS ASSISTANCE** — Information on availability of parts and how to obtain them.
2. **PRIORITY ASSISTANCE** — Who can get new equipment and how! Up-to-date information on latest regulations.
3. **LIMITATION ORDERS** — Interpretation of latest government limitation orders affecting construction equipment.
4. **SUBCONTRACT INFORMATION** — Frequently dealers possess information on subcontract opportunities.
5. **REBUILDING FACILITIES** — Enlarged, modern shop facilities to handle rebuilding with speed and efficiency.
6. **SERVICE EDUCATION** — Instructions on how to operate and service equipment correctly. Provides service school instructors.
7. **REPAIRS AND MAINTENANCE** — Quick, efficient repairing by skilled, factory-trained mechanics, using the right tools and genuine parts.
8. **USED EQUIPMENT** — In some instances, good rebuilt construction equipment may be available.
9. **RENTALS** — Good used equipment may be available for temporary emergencies.
10. **EQUIPMENT EXCHANGE** — Information center on used equipment available in territory.

Logistics
IS SHIPS AND MEN AND WIRE ROPE...

ROEBLING *"Blue Center"* helps 'em get there first!

Pushing stubby assault boats ashore, through withering enemy fire, storming the beaches and mopping up enemy strong points—advancing inland to take and hold strategic airports, towns, road and railroad junctions—there is more to a successful invasion than these stirring deeds of U. S. fighting men in North Africa. To make that invasion possible, to make it *stick* till all objectives are fully attained, takes the brains and brawn of thousands of men who may never get to see the fighting at all—sailors on escorting warships, seamen on transports, dockworkers and stevedores to load and unload thousands of tons of equipment and supplies. It is these men and their ships *and their rope-equipped machinery* that make up the physical basis of *logistics*—the art and science of getting there first with the most and *staying longest!*

It's a tough job, meeting all the needs of a sizeable army in the field against a powerful enemy. Army Engineers and special stevedore units, Navy crewmen, merchant seamen—all of them swing to with a will. And they keep the ammunition coming for men and guns. In many of these places where the going is tough today, Roebling "Blue Center" Steel Wire Rope is in there swinging. Bringing to this tough job too the extra values built into it by Roebling Engineers out of their experience in the field—in Roebling's mills—in Roebling Development Engineering. Meeting unfailingly all the demands of Victory.

ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

YOUR ROPE LOGISTICS . . . GET THE MOST OUT OF IT!

You can do a lot to save steel by observing simple precautions in the installation and handling of wire rope, and help conserve rope for use by our fighting men. To make the job even easier, Roebling has prepared a handy tag—yours for the asking—to fasten right to your machinery where it'll do the most good. Our nearest office will gladly supply you with as many as you need. Ask for Tag "A".

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

By removing the sharp rocks from this haul road and filling in the chuck holes, this crew is not only saving tires, but is also saving time and money.

To overcome the many tire hazards and abuses requires knowledge and skill that only a trained tire specialist can give. Firestone will place such a man at your disposal without charge.

Let him help you keep your tires on the job. Write Firestone at Akron, Ohio; Memphis, Tenn., or Los Angeles, Calif.

A COMPLETE TIRE CONSERVATION PROGRAM FOR YOUR ORGANIZATION

★ Inspect Your Tire Equipment

Firestone will inspect all your tire equipment and examine your operation to determine causes of tire failure.

★ Set Up Tire Maintenance Schedule

Firestone will cooperate with you to set up a complete tire maintenance procedure for your organization.

★ Show Educational Film

Firestone will show the film "How to Produce Extra Tire Service" which tells why tire failures occur and how to prevent them.

Firestone
OFF-THE-ROAD TIRES

ALL-NON-SKID EARTH-MOVER TIRE

For scrapers and trailer wagons. Low inflation pressures prevent impact breaks and provide maximum flotation and traction.

GROUND-GRIP TRUCK TIRE

For use on driving wheels of earth-moving trucks, truck tractors and semi-trailer units in soft going or fill at moderate speeds.

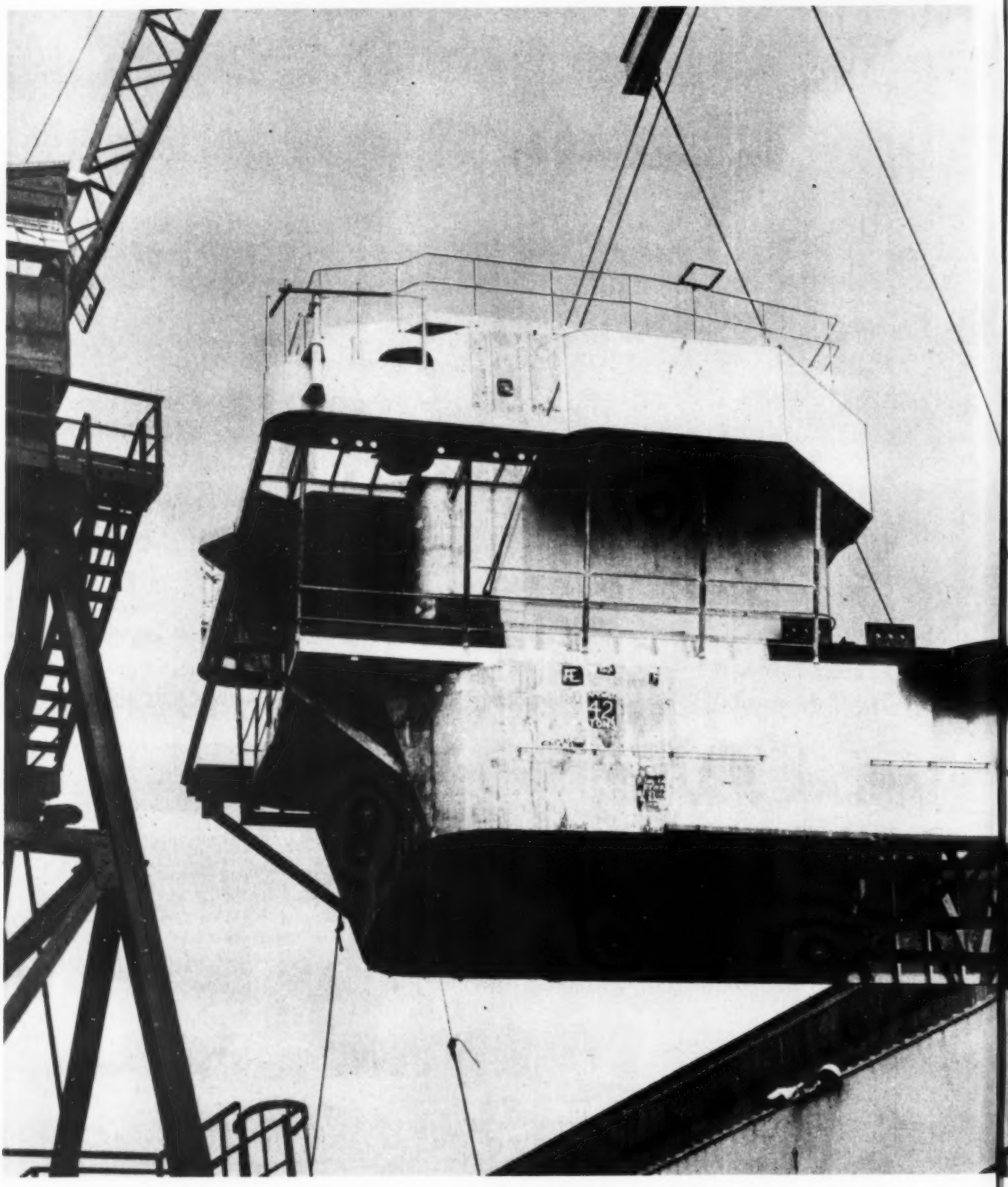
ROCK GRIP EXCAVATOR TIRE

Provides greater traction. Cut-resisting tread with double thick sidewalls for greater strength in strip-mining operations.

ROAD BUILDER

Has no equal for use on road graders. Compression fit of beads allow low pressures without slipping on rims. Ground Grip Tread gives maximum traction.

Listen to the Voice of Firestone with Richard Crooks, Margaret Speaks and the Firestone Symphony Orchestra, under the direction of Alfred Wallenstein, Monday evenings, over N. B. C.



TEXACO

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS

PROTECT YOUR CABLES for Vital War Work

SETTING in place this 40-ton destroyer deckhouse and other huge prefabricated ship sections represents one of the important wartime uses of wire rope.

To keep cranes, shovels, hoists, draglines, derricks in service . . . doing vital war work . . . operators everywhere are protecting their wire rope by lubricating it with *Texaco Crater.*

Texaco Crater penetrates to the very core of wire rope, sealing each wire in a tough, viscous film that reduces internal friction and wear, keeps out moisture, prevents corrosion, makes ropes last longer.

So effective have Texaco Lubricants proved in increasing output that they are definitely preferred in many important fields, a few of which are listed below.

A Texaco Lubrication Engineer will gladly cooperate in the selection of the most suitable lubricants for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write: The Texas Company, 135 E. 42d St., New York, N. Y.

THEY PREFER TEXACO

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated and fueled with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

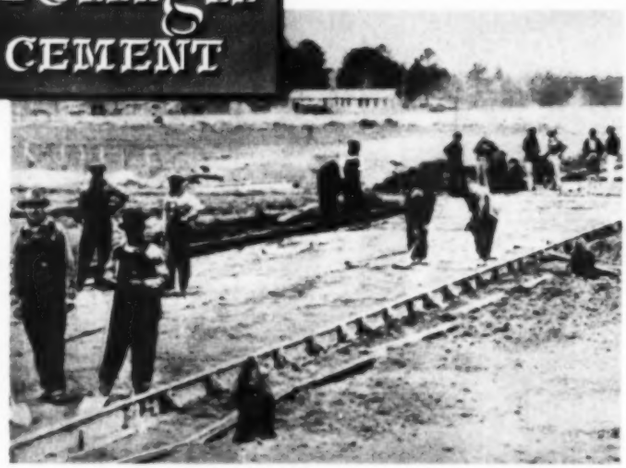
Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

ALL ROADS LEAD TO ROME... AND TO BERLIN AND TOKYO, TOO

Lehigh CEMENT



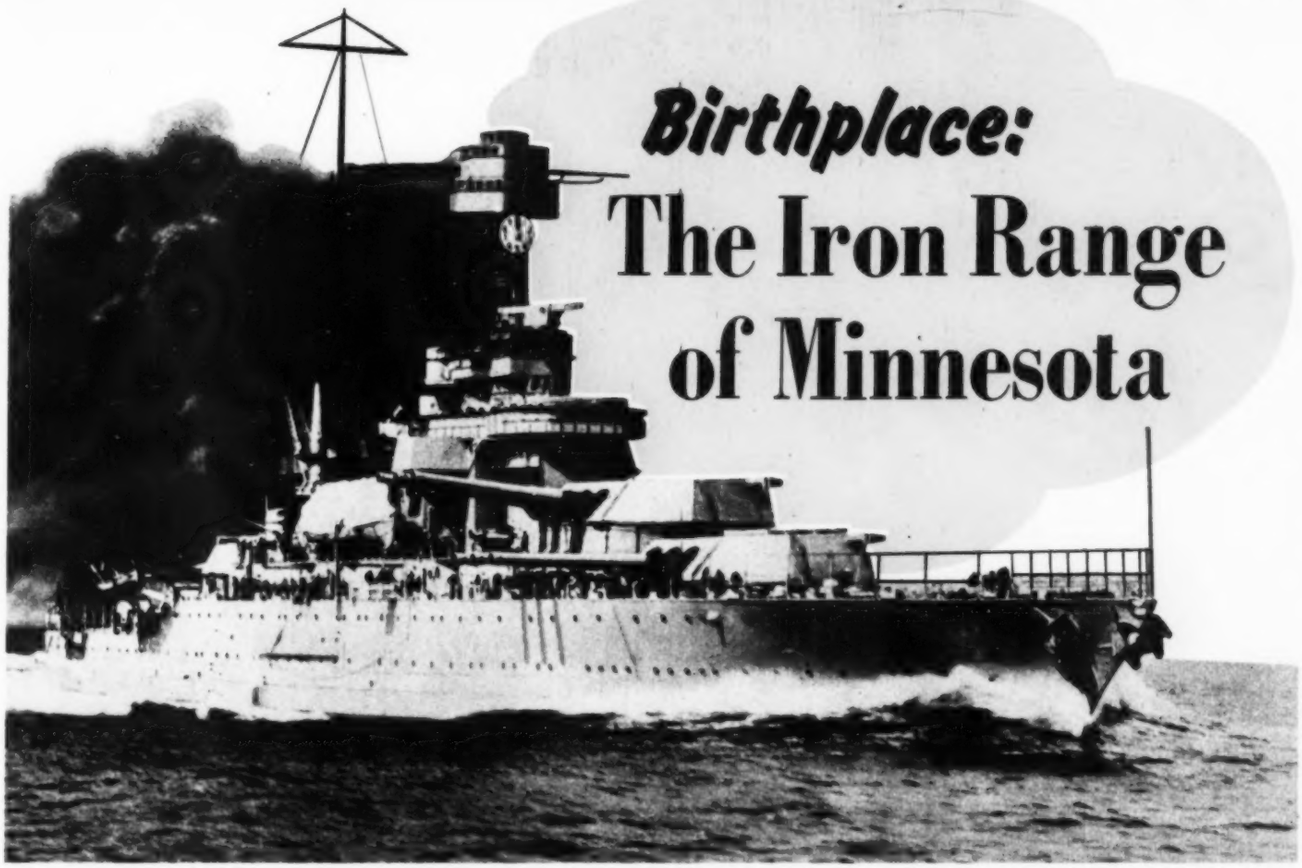
It's an old saying that all roads lead to Rome . . . and we amend that by adding that they lead to the other Axis capitals, too. America's far-flung network of concrete roads is speeding the transport of vital war supplies.

In peace and war, Lehigh Cement has played an important part in the building of America's highway system. And when the concrete had to be put into use in a *hurry*, Lehigh Early Strength Cement answered the need. It saves time by coming to service strength in ⅓ to ⅕ normal curing time. It makes a denser, finer concrete, too.

In every type of concrete construction, for war work and private work alike, Lehigh Early Strength Cement can contribute precious savings in time. It may be the answer to your own special problem. The Lehigh Service Department will gladly supply full details.

LEHIGH EARLY STRENGTH CEMENT
for service-strength concrete in a hurry

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.



Birthplace: The Iron Range of Minnesota

Official U. S. Navy Photograph

More than one monster American warship guarding Atlantic convoy lanes—battling in the South Pacific or patroling the Mediterranean, got its beginning in the vast ore deposits of Minnesota's Mesabi Iron Range.

Nearly four years ago Athey MobiLoaders started working on the famous Mesabi operations. Loading ore into railway cars, they are greatly reducing loading time, cutting costs and saving manpower. Using the time-saving method of overhead loading, Athey MobiLoaders are loading earth, gravel, coal, stockpile materials on urgent wartime jobs. Other Athey products are playing a part in fighting the war in logging production, oilfields, airport and military road construction, service with U. S. Combat Engineers.

A nation-wide organization of Athey-"Caterpillar" Dealers, too, is contributing unexcelled repair service facilities, job planning data, many other useful services.

IRON ORE IS ONE OF THE MANY VITAL WAR MATERIALS ATHEY PRODUCTS ARE HELPING PRODUCE

Athey

TRUSS WHEEL CO., Chicago, Ill.

MOBILOADERS FORGED-TRAK TRAILERS LOGGING CRUISER WHEELS

1. **Getting there,** regardless of obstacles, is a specialty with Uncle Sam's Armed Forces. Here, a team of soldier-engineers is throwing a ponton bridge across a stream to permit passage of modern mobile weapons and motor vehicles. An operation like this takes teamwork in the nth degree. U. S. Fighting Men were brought up on team play. As a result teamwork is now a "cinch" for them as they carry on toward Victory.

2. **H. D. Horton believes in teamwork!** He says: "Associated Transport, Inc., which I serve as Chairman of the Board, moves hundreds of war items, from airplane engines and propellers to parachutes and explosives. Every Associated Transport vehicle must deliver maximum mileage. Only teamwork by management, drivers, platform men and mechanics can 'keep em rolling.'" Associated Transport, Inc., New York, serves the Eastern Seaboard.

LET TIMKEN TEAM UP WITH YOUR ORGANIZATION NOW!

ARMY (E) NAVY
For Production
"Well Done"

Timken's new vehicle conservation program includes operators' aids, driving helps, complete data for maintenance men, a full-color sound slide-film on "TEAMWORK" and other valuable aids. Trained representatives of our Motor Transport Cooperative Service Department are ready to bring these practical helps to your organization. Their job is helping to keep America's vehicles rolling. Mail the coupon today for a free showing of "TEAMWORK" to your organization.

TIMKEN AXLES

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICHIGAN
WISCONSIN AXLE DIVISION, OSHKOSH, WISCONSIN

THE TIMKEN-DETROIT AXLE CO.
107 Clark Ave., Detroit, Mich.

We are interested in seeing the film "Teamwork."

Name _____

Address _____

City & State _____

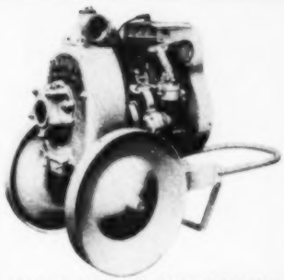
In PUMPS, the BEST COSTS YOU the LEAST

CERTIFIED HIGH PERFORMANCE

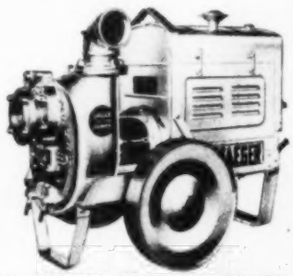
Every Jaeger Pump is Individually Tested and Guaranteed for Vacuum, Capacity and Pressure

THOUSANDS of EXTRA HOURS of SERVICE

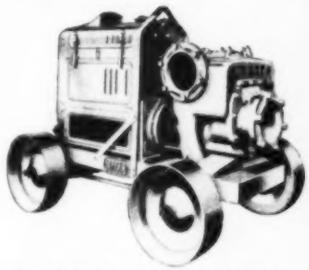
for Your Future Protection as Well as Profit



2" AND 3" HEAVY DUTY PUMPS: Finest engineered small pumps — stand high pressures, continuous heavy service.



4" AND 6" PORTABLE PUMPS: Big capacity (up to 90,000 G.P.H.) and years of service in compact, easy handling units.

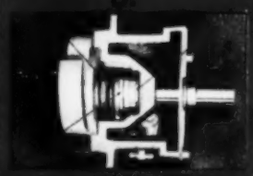


8" AND 10" BIG CAPACITY PUMPS: Huge air and water capacity (125,000 to over 200,000 G.P.H.), plus unequalled compactness and portability.

7 Reasons Why Jaegers Outlast and Outperform Other Pumps:

1. HIGH PRESSURE SHELL, of pat'd self-cleaning design.
2. REPLACEABLE LINERS.
3. PAT'D PRIMING JET, gives up to 5 times faster sure-priming.

4. HI-HEAD, HI-CAPACITY IMPELLERS (of steel in 4" to 8" sizes).
5. OVER-SIZE SHAFTS of heat-treated chrome nickel.



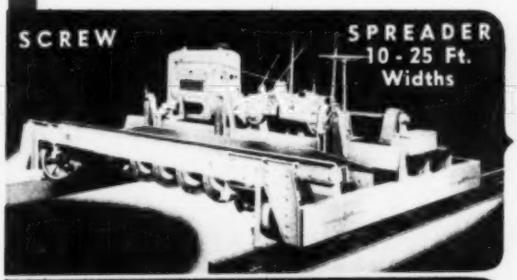
6. "LONG-LIFE" SEAL — accessible for inspection.
7. DIRECT DRIVE — ALWAYS IN ALIGNMENT — adds life to pump and engine.

DISTRIBUTORS EQUIPPED FOR SERVICE IN OVER 100 CITIES

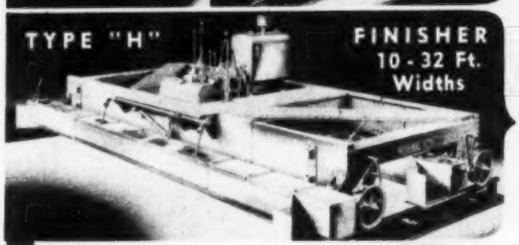
On Vital Roads and Airports, THIS JAEGER TEAM

gives you record-breaking production of smoother, better-wearing slab— saves manpower needed for other work!

By laying over 275 linear ft. per hour of 25 ft. slab, and over 480 linear ft. per hour of 10 ft. slab on airports, Jaeger paving teams have demonstrated their capacity for handling today's dry mixes at maximum paver output, with one-man machines, eliminating segregation and greatly reducing final hand finishing time. For evidence of stamina, a single Jaeger Finisher recently completed 1,250,000 sq. yds. of runway, working 6 days a week.



Screw reworks as it spreads; means denser, more uniform texture. Handles driest mixes.

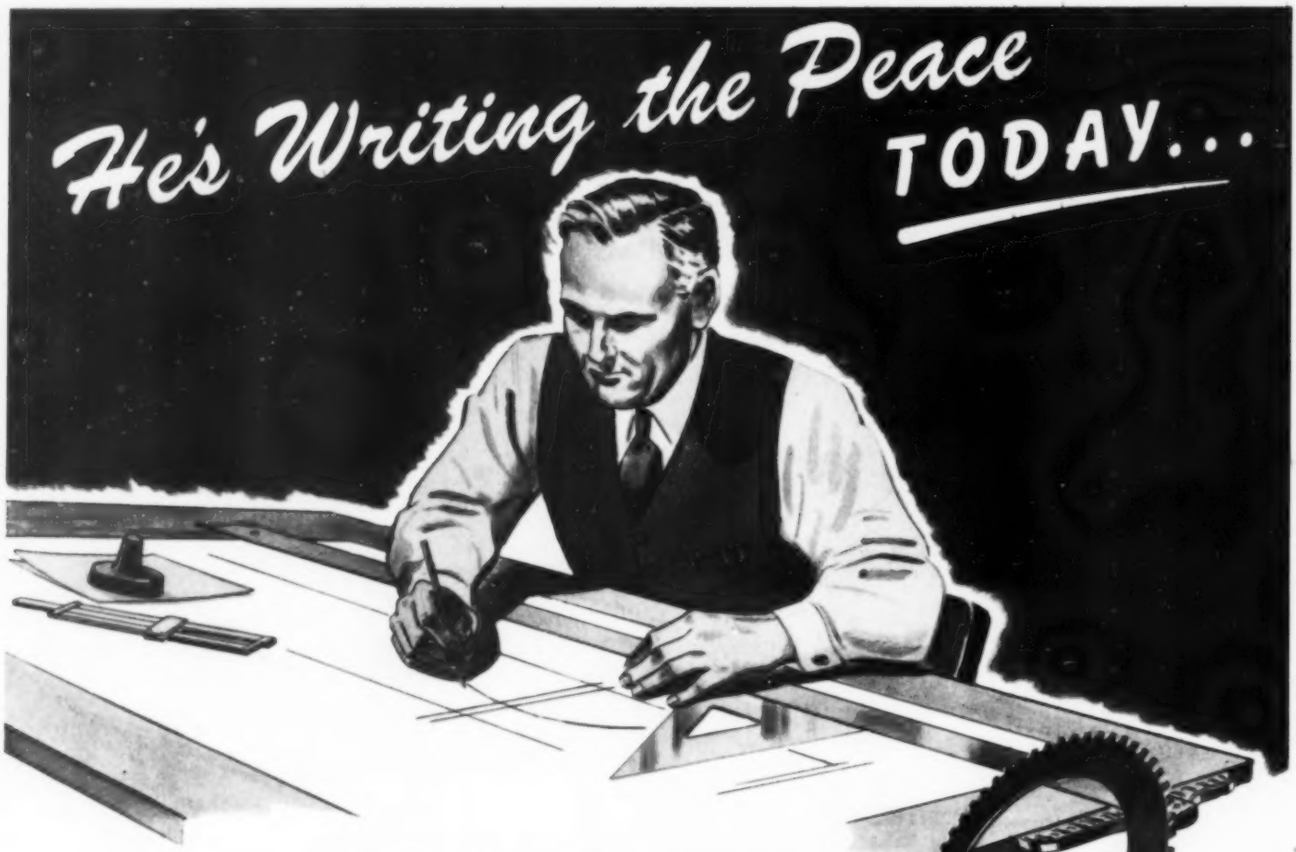


Transmission in front; direct lever control; independent screed speeds, maximum speed and flexibility.

THE JAEGER MACHINE COMPANY

800 Dublin Avenue, Columbus, Ohio, U. S. A.

He's Writing the Peace TODAY...



with VELVETOUCH

Tomorrow's earth-moving equipment will be even more rugged and efficient — thanks to wider use of VELVETOUCH clutches and brakes. Today, while most of the output of this remarkable friction material is going into the war effort, engineers in a hundred drafting rooms are designing post-war tractors, scrapers, shovels and power take-offs that will do more work at lower cost. In all brake and clutch applications they will utilize the many superior qualities of VELVETOUCH which give you assurance of smooth, positive, trouble-free operation.

VELVETOUCH is an all-metal friction material—a combination of sintered powdered metals, compressed and welded to a solid metal backing. Can be supplied in a wide variety of constructions for all clutch and brake requirements in contractor's equipment.

TRADE MARK REG. U. S. PAT. OFF.

Velvetouch

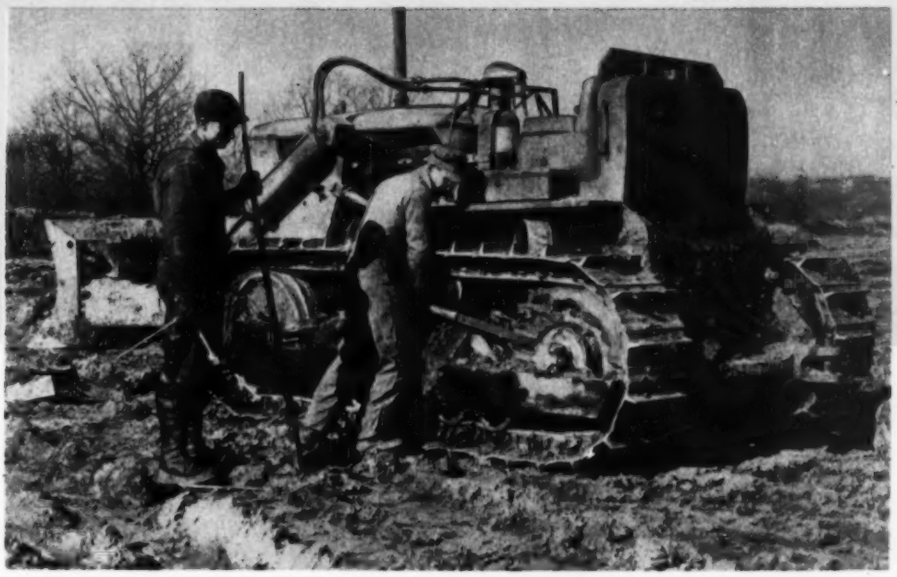
THE S. K. WELLMAN CO.

1374 EAST 51ST STREET
CLEVELAND, OHIO, U.S.A.

PIONEERS IN PUTTING POWDER METALLURGY TO WORK FOR INDUSTRY

LONGER LIFE FOR YOUR "CATERPILLAR" DIESEL TRACTOR

PREVENTIVE MAINTENANCE



• *A "Caterpillar" dealer's service man adjusts a final drive bearing right on the job, without loss of working time. Good service is more important now than ever.*

• • •

WARTIME work puts a punishing strain on tractors. There are fewer of them to go 'round — more jobs to be done, and done faster.

Yet it's more important than ever that the machines be kept rolling — piling up work-hours.

Your "Caterpillar" dealer shares your own vital interest in seeing that your "Caterpillar" Diesel Tractor gives you all the long, rugged, useful life that was built into it. His program of *preventive maintenance* is plain common sense that saves you down-time and repair costs, and saves critical metals for war.

How does it work? When you're running your "Caterpillar" Diesel night and day you naturally take extra care to keep it lubricated and make ordinary operating adjustments. But things you can't see may be happening in an overworked tractor . . . wear on hidden parts . . . loosening of tensions. In normal times you may have had your machine checked by your service dealer every six months. Now, with more hours of work a day, those inspections should be made more often.

In a few minutes an experienced service man with proper equipment can make any needed minor adjustments and warn you of any trouble that may be developing — *before* it happens. He'll check on such things as engine performance, the adjustment of the steering clutches and flywheel clutch, and on track tension and track alignment.

A good example of your "Caterpillar" dealer's preventive maintenance is keeping your final drive bearings properly adjusted. He has the special tools and knows how to do the job quickly and simply. But it should be done at regular intervals because it can *prevent* a lot of possible expensive repairs. If the final drive bearings are kept in correct adjustment, you won't have excessive wear in bearings and gears, or overflexing of the copper bellows seals.

Our fighting forces have first call on new machines and parts. That means all of us must do everything we can to conserve the machines now in use.

Preventive maintenance is one of your "Caterpillar" dealer's main job. He knows your tractor and how to keep it working efficiently. His precision tools and modern shop practices enable him to make service adjustments and repairs with the least expenditure of money and war-needed metals. His excellent welding equipment frequently doubles the life of such parts as sprockets, rollers, track links and track shoes. See him, and ask him about the new meaning of "Caterpillar" service.

WHAT ABOUT NEW "CATERPILLAR" DIESEL TRACTORS?

To provide for war-essential work at home, the War Production Board has made 15 per cent of "Caterpillar" Diesel Tractor production available for civilian purchase. If you need one of these machines and are qualified to have one, your "Caterpillar" dealer can help you obtain it. Ask him for details and advice.

ARMY E NAVY

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS!

IT BETTER BE *NEW*— AND *NEWS*

This is new. And it's NEWS for every post-war planner. World's largest fractionating tower. It's all-welded. Sets a NEW high in fit-up tolerances and fractionating efficiency—a NEW low in oil refining cost.

ALTER EGO: Yes—and a NEW high in construction savings. Tower shell costs 30.7% less, weighs 15% less. Trays cost 30% less, weigh 54% less—because of arc welded construction.

That's the post-war pattern! The NEW product must be a better product at less cost. Be it vacuum tower or vacuum cleaner the NEW product must obsolete the old models. Otherwise it's a sales dud.

ALTER EGO: Right! To build metal products that will win post-war sales we've got to think about how WELDING is now building the ADVANCED fighting equipment for winning the war.

That IS something to start this post-war thought: Since we will have to fight WITH or AGAINST new models, let's plan the NEW by finding out from Lincoln what's NEW in arc welding—and how to apply it.

Ask your inner self whether old models will SELL after the war.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

then I said to myself—

WELDING IS THE TOWER IN POST-WAR DESIGNS

The proudest moment in 74 years of LOWELL *History*

ON SATURDAY, April 17 of this year, the famous Flag symbolizing the Army-Navy Production Award was officially presented to this company.

We have had many proud moments here in the Lowell plant in the past. We've been proud—every man and woman working here—of the part played by Lowell Wrenches in the completion of great bridges, tunnels and other notable construction jobs.

We remember our pride in the performance of Lowell Wrenches on work in the last war . . . many of those Wrenches still in active service today.

But the proudest moment in 74 years of Lowell history was when the Army-Navy "E" flag broke out above our plant . . . symbol of the unstinting effort of the men and women who work here . . . without whose work this award would not have been possible.

Lowell Reversible Ratchet Wrenches will continue to serve this nation in peace as well as in war; speeding the work, saving man's effort, protecting men's lives, insuring a job well done; handed down from father to son as tools well worth the skill and pride of American workers.

LOWELL
WRENCH COMPANY
WORCESTER, MASS., U.S.A.
★ 1869—1943 ★

"YES SIR—You Can Always Rely on SMITH MIXERS"

Contractors and engineers invariably select SMITH MIXERS for their big concrete jobs. The inherent speed, efficiency and absolute dependability of the Smith Tilting Mixer is generally acknowledged in the industry . . . a reputation achieved over a period of more than 40 years on the world's greatest engineering projects: Boulder Dam, Shipshaw Hydro-electric Development, San Francisco-Oakland Bridge, Cherokee Dam, Fort Peck Dam, etc. etc. All sizes available . . . 28-S to 112-S. Write for full particulars.

The T. L. SMITH COMPANY
2851 N. 32nd Street
Milwaukee, Wis., U. S. A.

Smith 4 yard Tilter equipped with all-welded box girder pedestals and tilting frame, heat-treated gears and fully enclosed transmission. Five of these machines will soon be pouring concrete at TVA's new Fontana Dam.

The BIG Concrete Jobs are SMITH-MIXED

Something to remember for the future!

THERE is one great thing that we don't want you to forget! And that is that one out of every three Northwests sold for over 20 years has been a repeat order in the hands of successful companies.

Now all Northwests are repeat orders for one great purpose.

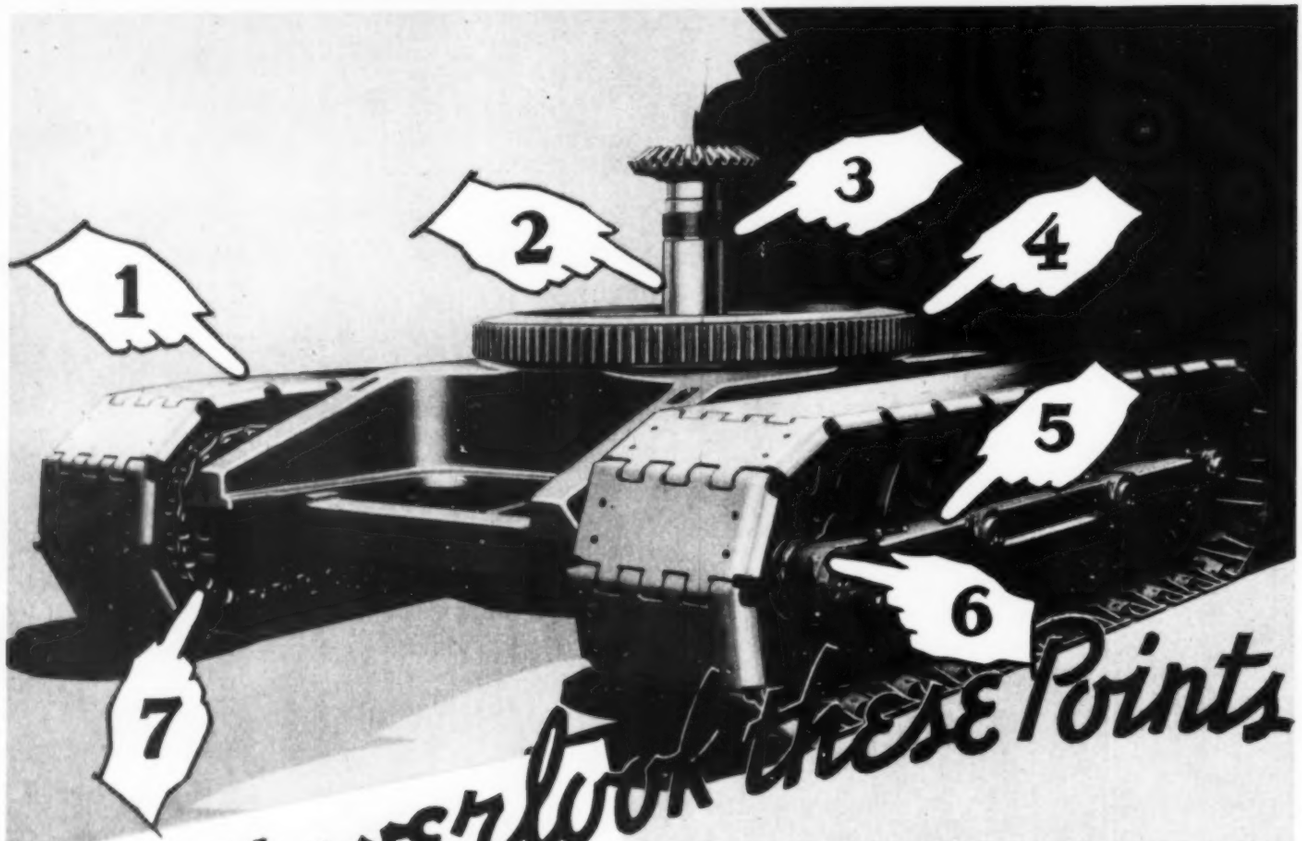
Watch Northwests under war pressure and plan to have Northwest advantages for your post war contracts.

Watch and buy war bonds.

17 MORRISON-KNUDSEN BOISE, IDAHO
5 JULIUS FORATH AND SONS
16 GENERAL CONSTRUCTION CO. SEATTLE, WASH.
15 LOCK-JOINT PIPE CO. AMPERE, N.J.
13 O'CONNOR CONSTRUCTION CO. FORT WAYNE, IND.
7 KERSHAW CONTRACTING CO. BIRMINGHAM, ALA.
FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS
MIDWEST CONSTR. & ASPHALT CO. CHICAGO, ILL.
WALSH CONSTRUCTION CO. DAVENPORT, IA.
CHICAGO BRIDGE AND IRON CO. CHICAGO, ILL.
AUSTIN CO. OF CLEVELAND
After VICTORY Buy NORTHWEST

NORTHWEST

NORTHWEST ENGINEERING COMPANY
1728 Steger Building
28 East Jackson Blvd.
Chicago, Illinois



Don't overlook these Points

1. Maintain uniform tension on both tracks. Crawler belts should have a minimum of sag except in sand or gravel where more slack is desirable.

2. Lubricate center pin bushing heavily twice each shift. Clean regularly to prevent heavy grease and dirt from collecting around adjusting nut.

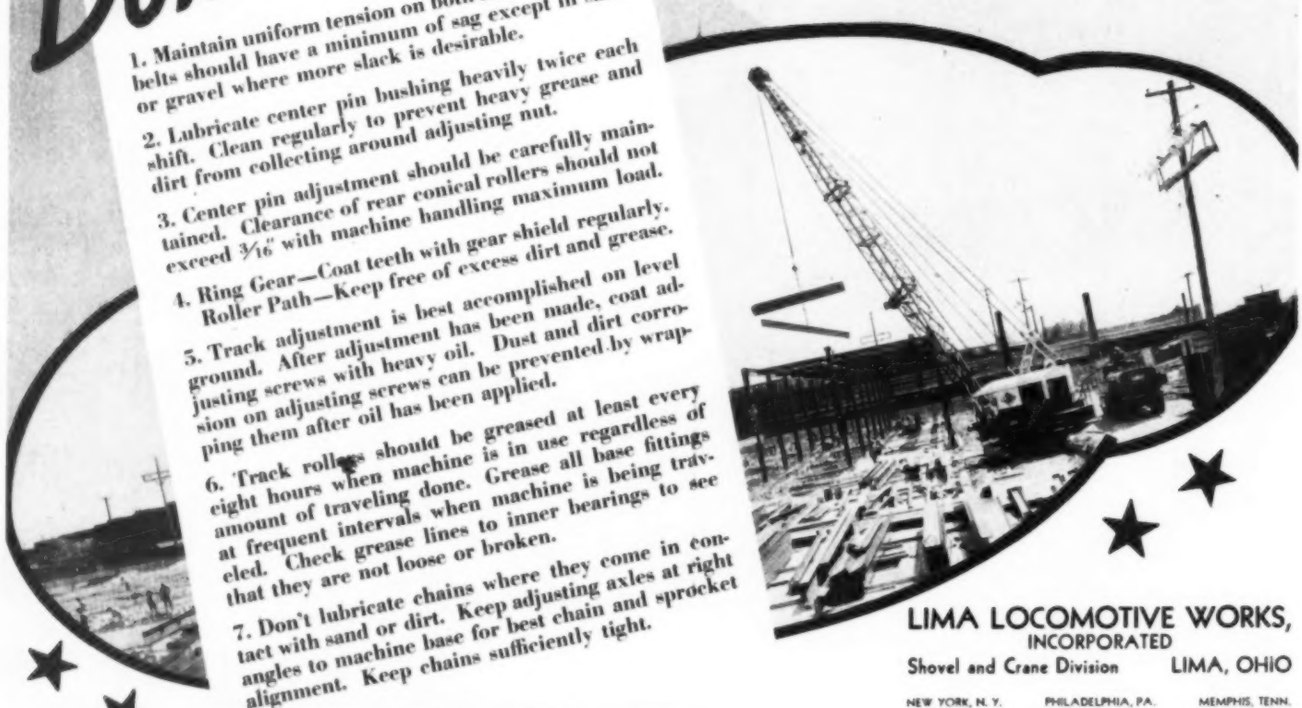
3. Center pin adjustment should be carefully maintained. Clearance of rear conical rollers should not exceed 3/16" with machine handling maximum load.

4. Ring Gear—Coat teeth with gear shield regularly. Roller Path—Keep free of excess dirt and grease.

5. Track adjustment is best accomplished on level ground. After adjustment has been made, coat adjusting screws with heavy oil. Dust and dirt corrosion on adjusting screws can be prevented by wrapping them after oil has been applied.

6. Track rollers should be greased at least every eight hours when machine is in use regardless of amount of traveling done. Grease all base fittings at frequent intervals when machine is being traveled. Check grease lines to inner bearings to see that they are not loose or broken.

7. Don't lubricate chains where they come in contact with sand or dirt. Keep adjusting axles at right angles to machine base for best chain and sprocket alignment. Keep chains sufficiently tight.



LIMA LOCOMOTIVE WORKS,
INCORPORATED
Shovel and Crane Division LIMA, OHIO

NEW YORK, N. Y. PHILADELPHIA, PA. MEMPHIS, TENN.
NEWARK, N. J. PORTLAND, ORE. DALLAS, TEXAS
SAN FRANCISCO, CALIF. LOS ANGELES, CALIF.
SEATTLE, WASH. MINNEAPOLIS, MINN. SPOKANE, WASH.
VANCOUVER, B. C. MONTREAL, QUEBEC, CANADA

SHOVELS **LIMA** DRAGLINES . . . CRANES

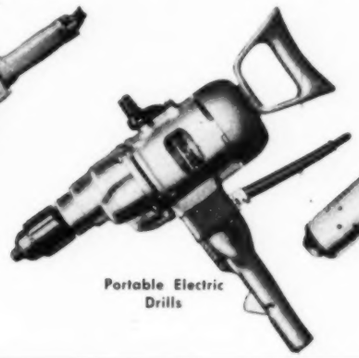
5 SUGGESTIONS that Can Help You

—keep your war construction rolling
—maintain other construction equipment

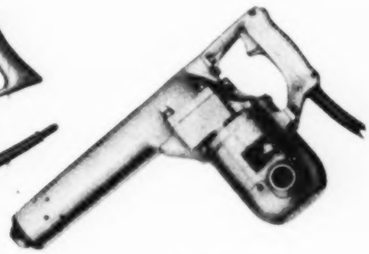
1 ***Do Jobs Faster, Better — Use Portable Electric Tools Whenever Possible***

These Black & Decker Electric Tools are helping war contractors in many ways . . . helping to speed up vital construction jobs of all kinds . . . helping to restore and recondition construction equipment for longer service.

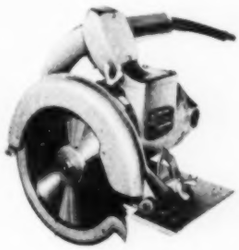
Portable Electric Sanders



Portable Electric Drills

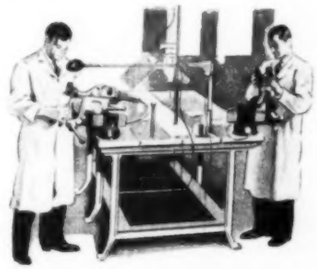


Portable Electric Hammers



Portable Electric Saws

2 ***Know Your Facilities for Expert Repair Service***



There's a Black & Decker Factory Branch near you (26 of them from coast to coast), always ready to give you quick, expert service if you need repairs. Factory-trained mechanics, working with genuine B & D parts, are your insurance against costly breakdowns that might tie up important war jobs.

3 ***Depend on Your Nearby Distributor as a "Source of Supply"***

Whether you want tools or tool information, your nearby Black & Decker Jobber is the man to see. He's dependable, convenient, al-

ways ready to help you with any tooling problems you may have. This "source of supply" service and largest field force in the electric tool industry can help you get *full* use of your electric tools . . . save vital hours on hurry-up war jobs.

4 ***Keep Your Tools Going on the Job — Here's the "Know How"***

Keep your equipment in good shape, keep your tools on the job. Check over tools regularly, see that they are well lubricated, oiled, cleaned — make 'em last. Send for these FREE handbooks on the "Care and Use of Electric Tools." They're helpful and informative — especially for new men on the job. Write: The Black & Decker Mfg. Co., 759 Penna. Ave., Towson, Md.

- ☐ General Tool Catalog
- ☐ Saw Handbook
- ☐ Hammer Handbook
- ☐ "Proper Use and Care" Drill Handbook

5 ***Get in the Fight Yourself — Get in the Scrap***

Uncle Sam needs every ounce of scrap metal, broken tools, obsolete machinery, junk. Reclaim it *now* . . . get it working for America . . . and help lick the Axis. GET IN THE SCRAP!

LEADING DISTRIBUTORS ARMY E NAVY EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

—with Continuous Course Correction!

CONTINUOUS Course Correction can be had only on the Adnun Black Top Paver. With each successive blacktop course, Continuous Course Correction reduces the irregularities caused by the inequalities of the subgrade. It is automatic, positive and does not depend on springs or manual controls of any kind. It is a foolproof assurance of smoother pavement.

Continuous Course Correction assures a smooth pavement with the minimum of rough grade preparation.

Initial compaction is provided by the design of the cutter bar without vibration and a dense course of the original mix results without bringing fats to the surface.

Here is a machine that gives true leveling without forms, accuracy of control and a course that rolls out smooth as silk. The future of road building is going to call for a lot of blacktop. Plan to know all about the Adnun. We will be glad to send literature on request to help you.

Built by the Builders of MULTIFOOTE CONCRETE PAVERS

ADNUN

TRADE MARK REGISTERED

BLACK TOP PAVER

WITH CONTINUOUS COURSE CORRECTION

THE FOOTE COMPANY, INC.
Nunda • New York
The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers

LaPLANT-CHOATE is 100% in the Fight!

WAR needs come first — so at times it is difficult for civilian users to obtain as much LaPlant-Choate earth-moving equipment as they might need. But we are making every effort to help your LaPlant-Choate-'Caterpillar' distributor keep your equipment in the thick of things 24 hours a day! Keep in touch with him; he'll help you keep 'em rolling!

LaPlant-Choate is proud of the War Service Record of the LaPlant-Choate-'Caterpillar' distributor. His job has been trying and difficult, but he has come through with flying colors. He has the will to serve . . . his repair parts stock has what is needed . . . his service facilities are constantly expanding with new helps for equipment owners. He's in there "pitching" for you and for the War Effort. So visit your LaPlant-Choate-'Caterpillar' distributor today or any day that you have earth-moving or equipment problems.

The LaPlant-Choate organization is proud of its Army-Navy "E" Burgee—awarded for outstanding achievement in War Production.

BUY
WAR BONDS
PLUS
WAR STAMPS

LaPLANT-CHOATE Manufacturing Co. INC.

Factory & Home Office
Cedar Rapids, Iowa

Pacific Coast Office
San Leandro, Cal.

EARTH MOVING - LAND CLEARING - SNOW REMOVAL EQUIPMENT

These three
SWING THE JOBS
in record time

THESE times call for more speed in off-the-road hauling.

Goodyear tires are the huskiest speeders-up on any equipment. They have been the construction world's first choice for more than twenty years because they deliver extra mileage and give less trouble.

All Goodyear off-the-road tires have Goodyear's multiple-compounded construction and low stretch Supertwist cord carcass — two features that make for greater toughness.

Goodyears are built in special tread designs for several types of work — rock, mud and sand — to give you greater traction and pull-through ability.

And all Goodyears are built with the maximum amount of new live rubber allowed by government specifications for tires to be used on essential wartime jobs.

Get Goodyears on your tire certificates and see for yourself why "more tons are hauled on Goodyear truck tires than on any other kind!"

Sure-Grip, All-Weather, Supertwist - T. M.'s
The Goodyear Tire & Rubber Company

YOU'LL PRIZE THIS BOOK

Send for free copy

This Goodyear Off-The-Road Tire Manual is packed with information on proper care and maintenance of tires that insures longer wear — save you money. Every contractor should have this complete service handbook. To get your free copy write Goodyear, Dept. SP, Akron, Ohio.

Goodyear's new sound slide film on Truck Tire Conservation is available for showings to group meetings of your drivers and maintenance men. Your Goodyear dealer or service store will be pleased to show it to your employes — just ask about it.

GOODYEAR

THE GREATEST NAME IN RUBBER

Construction Methods

ROBERT K. TOMLIN, Editor

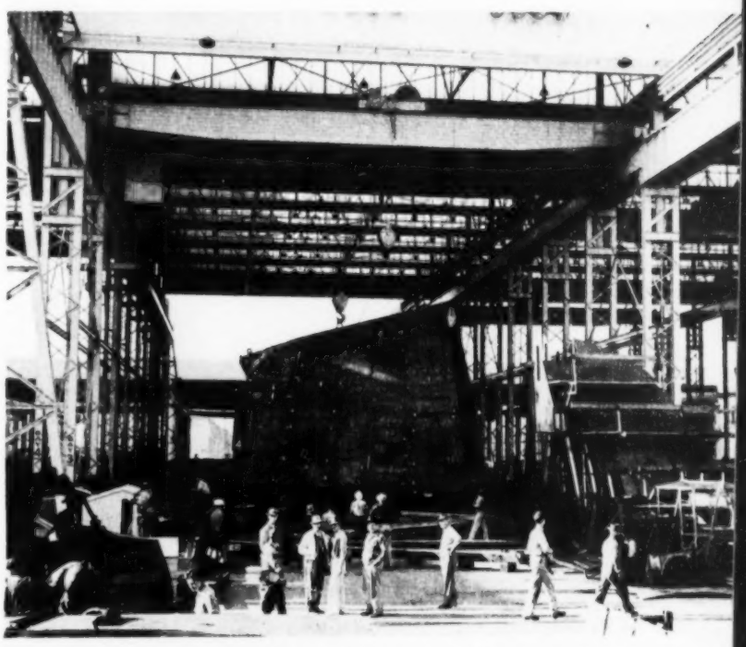
Volume 25 | MAY, 1943 | Number 5

Six-Way Shipyard

Prefabricates 40-Ton Welded Assemblies

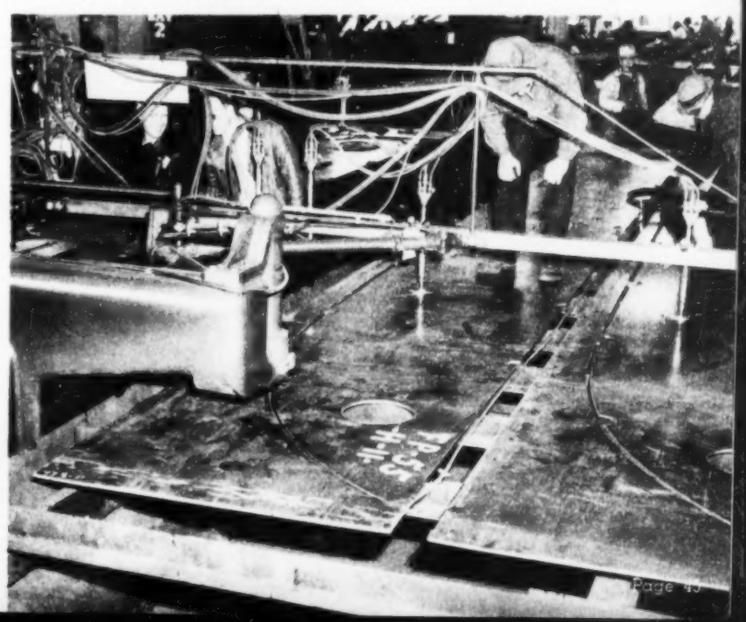
LARGE AREAS FOR PREFABRICATION of welded assemblies weighing up to 40 tons, commodious storehouse facilities, wide roadways for rapid transfer of equipment and materials and a deck-high outfitting dock eliminating the need for traveling gantry cranes are features of the 6-way shipyard of Marinship Corp., on the Pacific Coast, which is turning out EC-2 ships in record-breaking time. Sub-assemblies are welded in a main building 225x430 ft. in plan, consisting of six bays having a minimum vertical clearance of 40 ft. between floor and overhead crane hook. Outstanding features of shop equipment include special rotating supports for holding and positioning small assemblies for rapid welding and facilities for turning over large prefabricated sections in order to bring them into positions easiest for welding. Among the larger prefabricated assemblies produced at the yard are 40-ton hatches and deck sections measuring 57 ft. wide and 30 ft. long.

Marinship Corp. was organized as a division of the W. A. Bechtel Co., San Francisco contractor. Its key personnel includes K. K. Bechtel, President; W. E. Waste, General Manager; Ray L. Hamilton, Production Manager; E. C. Patton, Manager of Construction; and Robert Digges, Administrative Manager. The Marinship yard was designed by the Bechtel-McCone-Parsons Corp., of Los Angeles.



HUGE WELDED SUB-ASSEMBLY is picked up by overhead traveling cranes at Marinship yard for transfer to one of six ways where it will be incorporated in EC-2 ship.

IN PLATE SHOP (below) at shipyard, steel is cut accurately to specified shape by Travograph and then is welded into sub-assemblies.

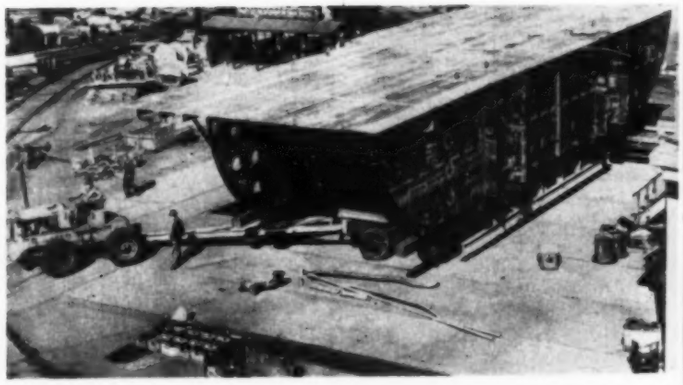


FOR TRANSPORT OF MATERIALS (below) at shipyard truck equipped with Dempster Dumpster is kept busy.

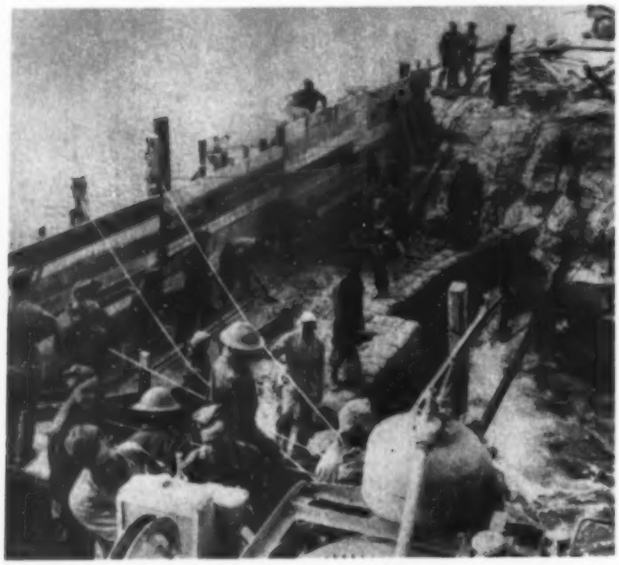
THIS MONTH'S NEWS REEL

TO DRAVO CORP., of Pittsburgh, Pa., is presented flag emblematic of Army-Navy "E" Award, for meritorious war production of landing ships for tanks (LST) and sub-chasers. V. B. EDWARDS, Dravo president, accepts award from Commander (now Captain) L. T. HAUGEN supervisor of shipbuilding for the Navy's Pittsburgh area.

World Wide Photo



NEARLY 1/10 OF ACRE OF STEEL. 15 ft. deep with floor space the size of singles tennis court, is hoisted aboard trailer and pulled by tractor across Federal Shipbuilding & Dry Dock Co. yard. This huge piece of ship's hull framing was assembled upside down to accommodate maximum number of workers and to permit as much "down-welding" as possible. In spite of its tremendous size, large section will fit to fraction of an inch its place in hull and will be welded to other segments to make one continuous steel ship.

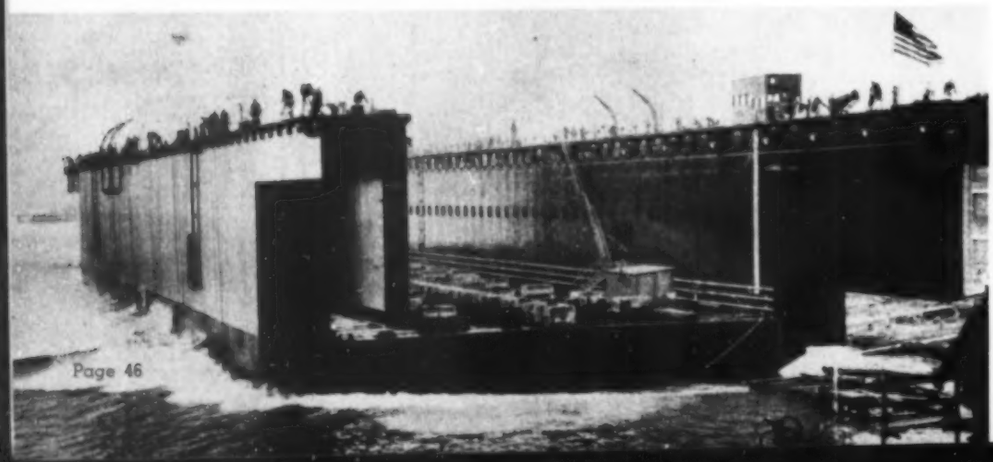


BENGHAZI HARBOR. damaged by retreating Nazi forces, is quickly repaired by British troops and native laborers to make it usable for advancing 8th Army. Here concrete is being placed behind sand bags to restore harbor's outer wall.

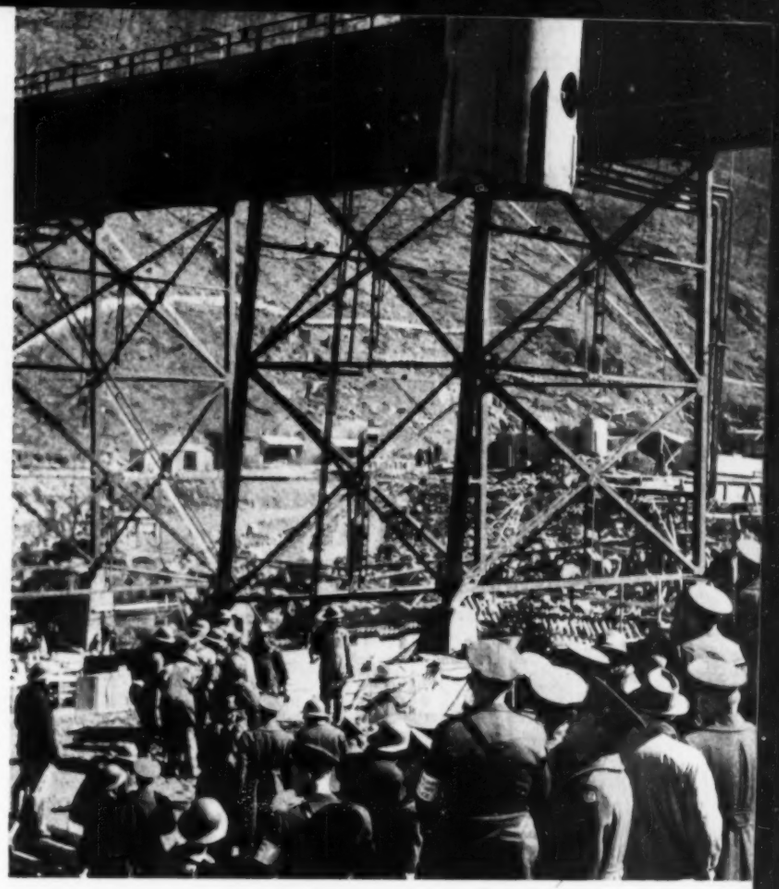
British Combine Photo

SEAGOING SECTIONAL DRYDOCK (left), an innovation in Naval construction, is launched by Chicago Bridge & Iron Co. at Eastern yard. Huge steel center section shown here, when combined with two end sections, will accommodate light cruisers. Battleship-heavy cruiser docks are composed of larger sections with capacity of 10,000 tons each. Ten sections joined will accommodate largest battleship, and seven sections, heavy cruiser. Built to be seaworthy, docks may be towed at 10 knots, but are designed to permit installation of propulsion machinery. While being moved, sidewalls are folded inward to cut down wind resistance and lower silhouette for protection. When ready for use, sections are sunk by submersion machinery and sides raised by buoyancy chambers to operating position. Machine shops also have been designed to accompany drydocks.

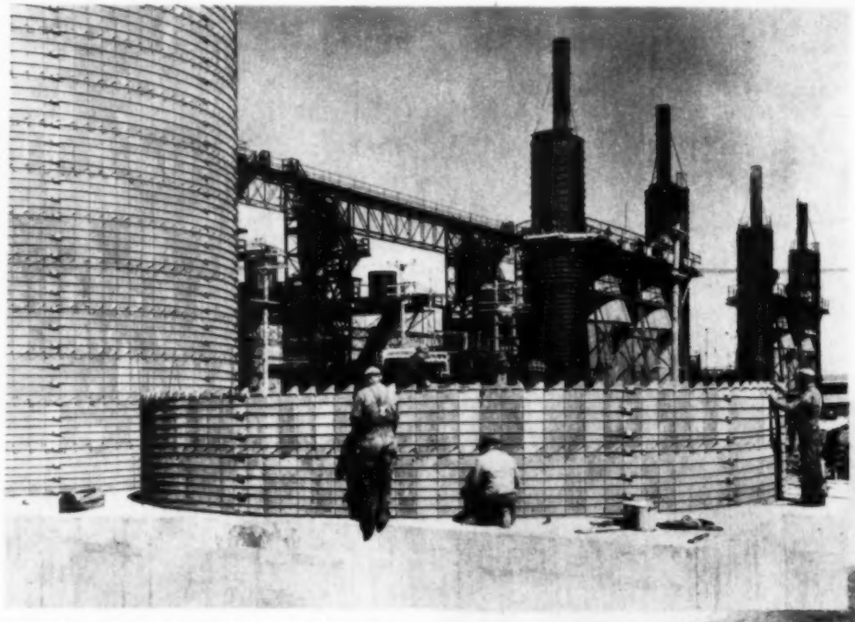
Press Association Photo



FRANK BARRETT, of San Francisco general contractors Barrett & Hilp, wields shovel that starts initial buggyfull of concrete into first of 26 concrete barges his firm is building at Belair shipyard for U. S. Maritime Commission. STANLEY BROWN, general superintendent of daytime operations, is dumping concrete buggy while FRED HOGADON, superintendent of concrete placement (center), and his assistant CHARLES VARLEY, witness operation.



TVA'S FONTANA DAM, highest east of Rockies, receives its first bucket of concrete before interested spectators. Crane handling concrete bucket travels on temporary steel construction bridge.



NEW MAGNESIUM PLANT built by The Austin Co., of Cleveland, somewhere in Michigan, starts production of lightest of all structural metals for Dow Magnesium Corp. Designed to save crittical materials, plant makes extensive use of wood and plastics where steel and other metals would normally have been employed. Project includes rigid-frame concrete structure with double-hinged arch of 100-ft. span which will house all alloying operations. Unusual feature of installation is use of solid silver bus bars, instead of copper, to carry electric current. In foreground are precast concrete stave silos for storage of magnesium chlorite.

OVER ROOF OF WORLD, through Himalayan mountains, new supply route is being built into China. New Assam road **(below),** more than half at an elevation of 10,000 ft., was chartered many years ago to run from Sadiya, India, to Chungking on route 400 mi. north of Burma road. Soon after Burma road was cut off by Japanese, 5,000 coolies began construction of new route to supply China's warriors and later to take part of burden from Burma road.

Photo from Paul Guillumette, The Chinese News Service

TRANSPORTATION—a vital war factor

The effectiveness of our armed forces and civilians alike depends on the efficiency of our transportation

As the battle of Tunisia entered its final phases, with the British and American forces joining hands to crowd Rommel into his last fox hole, Hitler and Mussolini held their twelfth war-time meeting.

One important purpose of this meeting, according to the Berlin radio, was the study of a specially prepared "Survey of Continental Reserves". Topping this list of resources is the item of transportation.

Hitler has a great many headaches these days but, according to no less an authority than the Reich Ministry of Economics, "the central problem of the whole German war effort is transportation". It is, in fact, the Achilles' heel of Germany's War Machine.

The Nazis have become soberly conscious of its crucial importance and Mr. Hitler must wince when he recalls the gigantic miscalculations which led him to neglect his railways.

He counted on a short war, not a long wear-and-tear war and Germany's transportation crisis is getting more critical by the hour. It will play a vital part in its defeat.

This is a war of movement – on land, on sea and in the air. Russia's 2,000 mile battleline, R.A.F.'s 700 mile bombing raids, General Montgomery's 1,500 mile advance last November and the vast area that constitutes the theatre of war in the Pacific make this fairly obvious.

Peace will come when one side gets control over the world's supply of fuel, oil and rubber, for on these three critical materials depend all the vehicles of war – as well as of peace.

An army used to travel on its stomach. Today it travels on its fuel tank.

On the home front, transportation is no less vital. Here it is essential in getting the war workers, their raw materials and their products, to and from the mines, mills and factories that supply our armed forces and those of our Allies. Transportation is a major factor in the nation's ability to out-produce its enemies. Every known method, every type of vehicle becomes essential, for no single group of carriers, freight or passenger, can meet all our needs.

The railroads opened the vast resources of our nation and continue to be the backbone of our transportation system. Today they are doing the greatest job in their history. They are hauling more tons of freight more miles than ever before – 33% more than in 1941 and 55% more than in 1918, peak year of the first World War. They are carrying more passengers more miles than ever before – 80% more than in 1941 and 24% more than in 1918. They are getting more work out of each car, each engine, and each mile of track than ever before. Private operation of railroads is proving far more effective and efficient in this war than did government operation in the last war.

In contrast to Hitler's Germany, the managers of the American railroads have not neglected their plant except where government priorities forced them to do so. They are turning in an unprecedented performance despite the long starvation period to which they were subjected. During the first World War the total investment in the American railroad plant was about $18,600,000,000. Since then $12,000,000,000 have been spent on improvements and after deductions for scrapped facilities the net increase has been $8,000,000,000. Since the present war in Europe began the railroads have invested about $1,650,000,000 in further improvements, many of them to meet special war needs.

Convincing evidence of the railroads' flexibility in meeting the special needs of all-out war is their performance in coping with the movement of oil to the East Coast. In January 1942, one month following Pearl Harbor, the railroads delivered to the East Coast by tank car less than 100,000 barrels daily. By December they had stepped this up to more than 740,000 barrels and during the week ended April 3, 1943 they averaged more than 900,000 barrels per day. By the end of this year they are shooting for the goal of one million barrels a day.

Unlike Germany we have not attempted to control the development and growth of motor transportation according to the "intuitions" of one man but have wisely left it in the hands of experienced competition. That is how our highway transportation system came into being. Growing public acceptance has made it an essential part of our national economy.

The motor vehicle, its limitations set only by the improved highway and the supply of fuel and rubber, has developed to undreamed of proportions. Up to a year ago private automobiles consistently moved more people more miles than *all public carriers combined*. Buses have become an accepted means of mass transportation. Local electric and interurban railways in many cases were converted to bus lines and trucks took over the local freight services. Under these improved operating conditions traffic volume increased. When the war in the Pacific made it necessary for us to conserve our supply of rubber and the U-boat depredations in the Atlantic throttled the flow of gasoline to the eastern seaboard, our motor transport was forced to grapple with the toughest problem that ever had confronted it since it became so vital a factor in the every day transportation.

The "share-the-ride" idea recognizes the need of conserving gas, oil and rubber. This particularly applies to buses, for wherever groups can be assembled for a common destination, buses can be used most effectively. The intercity bus performs for the rural areas the same service that the local bus renders for the residential areas of our cities.

Reorganization of railroad schedules, adaptation of motor transport, rearrangement of working hours, all have contributed to provide a flexible transportation service for men and materials to meet the critical needs of the war effort. Twenty thousand intercity buses are handling 635 million passengers a year which is 69 per cent more than in 1941. The fact that these buses carry a relatively larger percentage of the total coach passenger business than their seating capacity would indicate suggests that here, too, we are getting a more efficient use of these vehicles in terms of passenger loads carried. It is fortunate to note that the geographic location of most intercity bus lines does not coincide with that of the railroads but rather supplements it.

The contribution which the urban transport industry is making to the war effort becomes apparent when we consider that buses, trolley buses and street cars today carry passengers at a rate which promises to exceed the impressive total of 21 billions, as compared with 18 billions in 1942 and an average of 13½ billions for the period 1936 to 1941. And this the industry is accomplishing with a minimum of added equipment and despite a serious drain on its manpower.

The truck lines, too, are setting all-time records. They have rearranged their schedules, eliminated circuitous routes and coordinated their services with those of other carriers. As this is written, contract truckers with the cooperation of the Office of Defense Transportation are trying to eliminate the empty return trip.

The transportation industry as a whole is face to face with the biggest job in its history. Increasing traffic loads, with little if any new equipment, difficulty in obtaining essential maintenance materials and a growing shortage of manpower, combine to make it that. While federal authorities, acting through the Office of Defense Transportation, took prompt cognizance of this condition, froze equipment and otherwise acted to conserve the vehicles then in service, it was not possible to add sufficient vehicles to keep pace with the increased traffic demand. However, the O.D.T. did lend impetus to the movement for staggering hours of work thereby spreading the peak loads and thus increasing the carrying power of existing fleets of vehicles in city service.

As we review the problems involved in meeting our transportation needs it is evident that we cannot depend upon new equipment alone for their solution. Lend-Lease is taking a considerable share of our much needed output of transportation equipment. The immediate job is up to the rank and file of the transportation industries. It is up to their resourcefulness and devotion to their job. The operating men out on the road, the men in the shops who keep the equipment going, who make the most of the metals and other materials they can have, who salvage, conserve and economize . . . these are the men who must bear the burden of our war load.

Theirs is a dramatic story, a story of cooperation and coordination . . . of ever increasing capacity on a shoestring allowance of new equipment.

For this is a war of movement. According to Joseph B. Eastman, Director of Defense Transportation, both the passenger and the freight traffic on the railroads is to a large extent war traffic – the transportation of troops and civilians on war business, the movement of food, raw materials and finished products required for the prosecution of the war. As Mr. Eastman put it, delayed arrival of troops at embarkation ports, delayed delivery of vital war materials could even conceivably mean the loss of men at the fighting front. And what Director Eastman says of the railroads applies to all forms of transportation. Transportation by bus, by street car, by truck, by train, by ship and by plane . . . all play a vital part in the achievement of victory . . . on the home front and on the fighting front which relies upon it.

This is the eleventh of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

James H. McGraw Jr.

President, McGraw-Hill Publishing Company, Inc.

By Making Big Ones Out of Little Ones

STIMULATED TO THE EXERCISE of great ingenuity and enterprise by WPB refusal to allow new 52-in. steel pipe for a sorely needed second supply main 40,000 ft. long, the Springfield, Mass., Municipal Water Works, with the aid of the Walsh Holyoke Steam Boiler Works, engineered a feasible substitute to take care of mounting water demands by improvising a high-grade auxiliary main 13,000 ft. in length of 51- and 59-in. welded pipe *refabricated* out of 26- and 30-in. sizes. Daniel O'Connell's Sons, Inc., Holyoke, Mass., now is laying the new parallel line and hooking it up to an existing 42-in. conduit to decrease friction losses and increase the carrying capacity of the present system by more than 25 percent, thereby assuring a daily water supply sufficient to satisfy the requirements of a highly industrialized service area containing many giant war plants.

At the boiler works, the 26-in. O.D. pipe (¼-in. wall thickness) and the 30-in. O.D. pipe (⅜-in. wall thickness), purchased in the course of a few days' airplane expedition from unused yard stocks scattered over various states from Pennsylvania to Texas, are first split by burning along welded longitudinal seams, are straightened by unrolling on an ingenious machine developed for the purpose, are rerolled to new diameter, and are welded into the large sizes by joining two plates from 26-in. pipe for 51⅜-in. I. D. tube and two plates from 30-in. pipe for 58⅞-in. I.D. tube.

Half-circle butt straps are welded to the ends of the pipe sections, which are uniformly 30 ft. long for straight sections and sometimes longer for shop-fabricated angle bends, and the pipe is dipped vertically in hot tar to provide a minimum 0.03-in. coating. The two sizes of large-diameter pipe, of different wall thicknesses, are laid in appropriate parts of the 2½-mi. water main in accordance with variations in hydrostatic pressure. Maximum working pressures in the pipe will be about 40 psi. less than the specified test pressures of 169 psi. for ⅜-in. wall, 58⅞-in. I.D., and 129 psi. for ¼-in. wall, 51⅜-in. I.D.

Necessity Again Proves Mother of Invention

★

When 52-in. steel pipe for urgently needed water main was ruled out by war restrictions, small-diameter pipe was split, straightened, rerolled, and welded into large-diameter sections.

BY INGENIOUS IMPROVISATION of sorely needed auxiliary supply main from hastily acquired stocks of smaller-diameter pipe, ELBERT E. LOCHRIDGE (left), chief engineer of Springfield, Mass., Water Works, with assistance of JAMES B. PORTER, associate water engineer, develops additional carrying capacity in system to meet demands of war-expanded industries.

FWA Participation

To undertake the work, even with refabricated pipe, federal certification first had to be obtained. The Federal Works Agency certified the necessity for the project and allotted $214,800 of Lanham Act funds toward the cost, estimated to total $537,000. Of this amount, $378,000 represents cost of pipe, engineering and supervisory overhead, and $159,000 is the estimated total cost of laying and welding the line, complete and ready for service, under a $9,000 fee contract with Daniel O'Connell's Sons, Inc. An illustrated article in next month's issue will describe the work on the latter contract.

FWA participation covers the extra cost of refabricated pipe as compared with new 52-in. I.D. pipe, which the municipal water works had contemplated using for its auxiliary main almost from the time when it first tapped its Little River supply in 1909. If it could have been obtained, 52x⅜-in. welded steel pipe would have cost about $11.50 per lin.ft. de-

livered to the ground on the job. Average cost of the refabricated pipe (4,000 ft. of 58⅞-in. and 9,000 ft. of 51⅜-in.) delivered to the ground along the line is about $26.10 per ft. The difference, amounting to $14.60 per ft., or nearly $190,000 for the 13,000 ft., is more than offset by the $214,800 allotment from FWA.

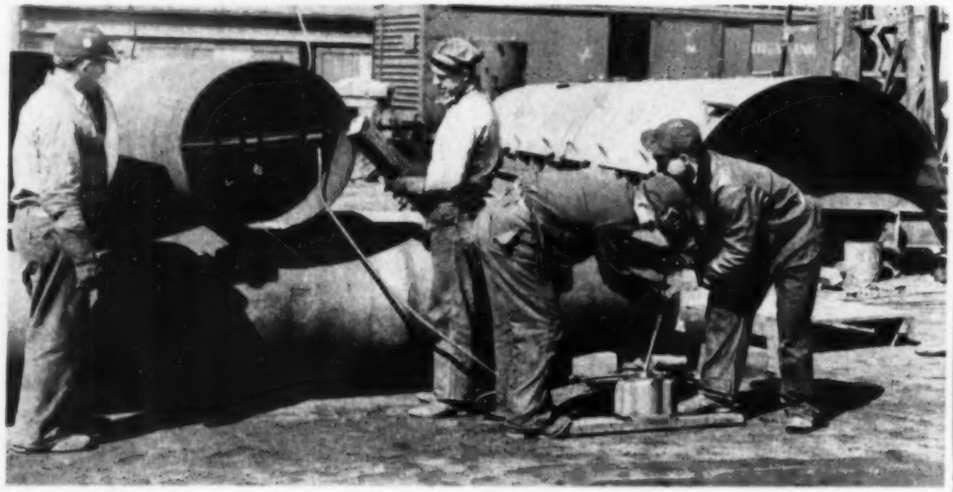
Accompanying photographs tell a step-by-step story of methods employed by the Walsh Holyoke Steam Boiler Works to refabricate the 26- and 30-in. O.D. pipe into 51⅜- and 58⅞-in. I.D. sizes. It is interesting to note that one of the automatic welding machines used on the large pipe was originally developed by the General Electric Co. in 1927 to fabricate in the same shop 48- and 54-in. butt-welded steel pipe for a 6¼-mi. Springfield water line with riveted joints, believed to be the first use in the East of welded pipe, and described in *Construction Methods*, June, 1928, p. 6.

A pipe unrolling machine developed by the boiler works for this job is the key to the refabrication process. Operation of the machine is shown by photographs.

Considerable experimenting went into the building of the apparatus.

STEP-BY-STEP

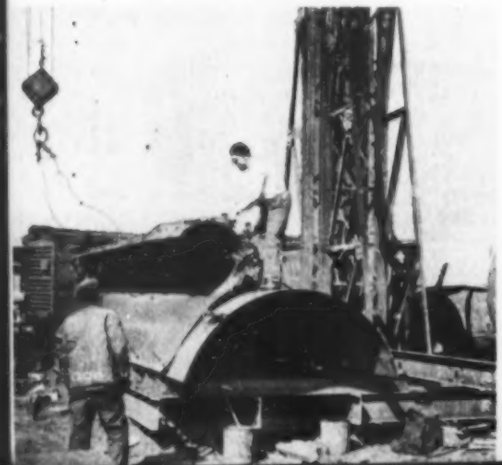
1 **AS FIRST STEP** in refabricating 26- and 30-in. pipe into larger sizes, workmen split pipe along longitudinal welded seam with Oxweld automatic gas cutting machine propelled by electric motor on steel frame track specially constructed to permit operation of torch on 26- and 30-in. tubing. Machine cuts bar welds on 30-in. pipe of ⅜-in. wall thickness at 14 to 15 in. per min. and makes about same speed in cutting plain butt welds on 26-in. pipe of ¼-in. wall thickness. When operating self-propelled cutting machine on latter pipe, as shown here, three-man crew splits eight 40-ft. lengths in 8-hr. day.



2 **SPLIT PIPE** is spread by Blackhawk hydraulic jack to permit insertion of timber block which maintains enlarged opening in cut longitudinal seam. Spreaders are installed in both ends of 30-ft. pipe section before pipe is transferred to arch-shaped straightening apparatus in right background.

A SECOND ARTICLE, in next month's issue, will describe and illustrate how the refabricated steel pipe line at Springfield, Mass., was installed.

6 **WITH FIRST HALF UNROLLED (below)**, six pulling cables are relaxed and two wire ropes of bridle hung from derrick hoist block are hooked to clevis clamps at ends of partially straightened pipe. These clamps were fastened to pipe when it was first set up in straightening machine, as shown in Fig. 4. Unrolling also has beneficial effect in removing mill scale from plate.



7 **PICKED UP (below)** by derrick bridle from straightening machine, partially unrolled pipe is ready to be swung around to allow edge of unstraightened portion to be placed in hold-down angle.

8 **WITH SECOND PIPE EDGE (below)** wedged in hold-down angle, six pulling cables are hooked to other edge and are drawn taut by derrick falls raising common block in tower to unroll second half of pipe. Pipe rollers again are used under wire ropes.

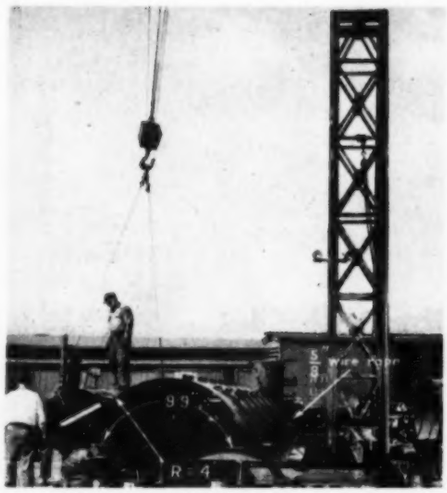
The radius and rise of the arched steel plate over which the pipe are unrolled, for example, were determined after several trials with various dimensions had demonstrated that a 9-ft. 9-in. arc of 4-ft. radius gave the best results. With the synchronized system of six wire-rope cables leading to a common block, the straightening machine is able to unroll 20 to 22 plates for production of 360 to 390 ft. of pipe per 8-hr. day.

Vertical dipping of cold pipe in a tank 40 ft. deep is uncommon enough to merit comment. As contrasted with the ordinary method of pre-heating pipe by oil torches and dipping horizontally, the vertical cold-pipe dipping procedure gives superior results in reduced volatilization of tar, tighter adhesion and more uniform coating. Immersing the pipe for sufficient time to heat it to the temperature of the tar requires 30 to 40 min. and makes the actual dipping slower than with preheated pipe, but the effects are better, as the method avoids rapid volatilizing of the tar by hot steel. Use of T-12 tar has proved entirely satisfactory.

Pipe are dipped in a double-walled steel kettle, with the tar contained in

(Continued on page 141)

REFABRICATING METHODS



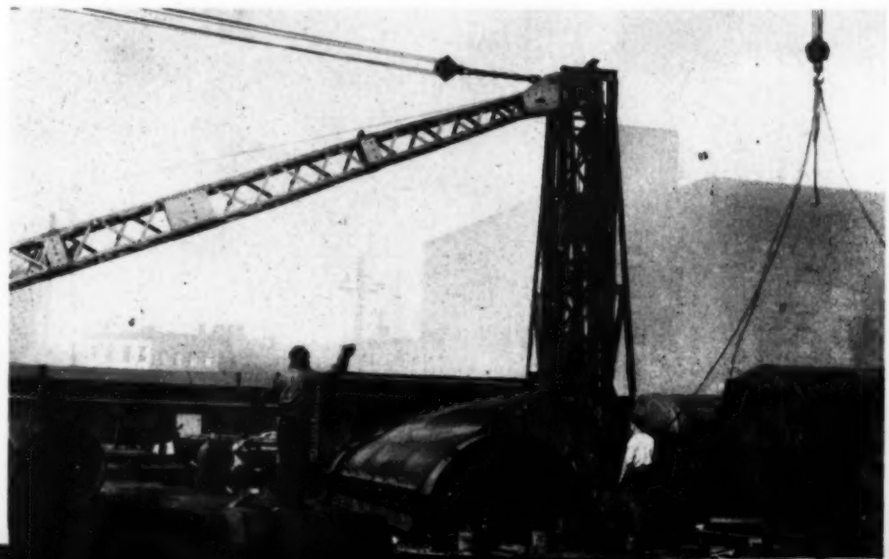
3 **STRAIGHTENING MACHINE** developed by Walsh Holyoke Steam Boiler Works for unrolling pipe consists of arched ⅜-in. steel plate on steel channel bedframe; split tubing is unrolled over arch by six ⅝-in. wire-rope pulling cables reeved to common block at base of steel tower, which serves as guide frames for derrick falls used in raising central block to exert uniform pull on cables.

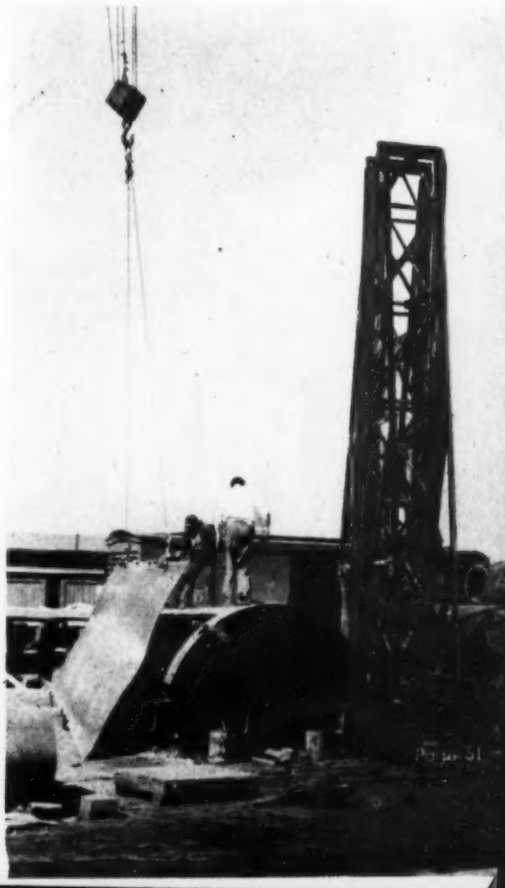
4 **PREPARATORY TO UNROLLING PIPE,** one edge of split tubing is set in hold-down angle at base of steel arch and is made tight there with wood wedges tapped in place between pipe metal and arched plate. Workmen attach plate hooks at ends of pulling cables to other edge of split pipe, laying rollers on crown of arch under ropes.

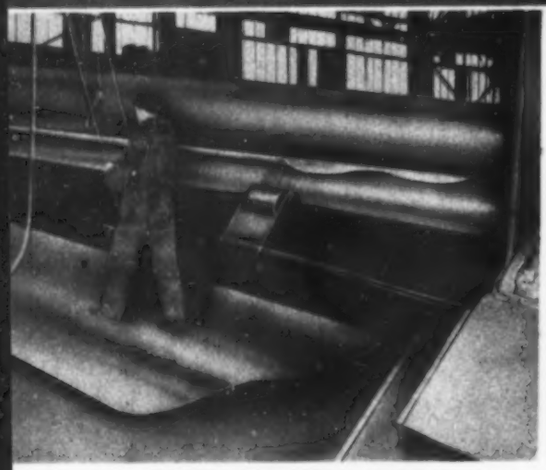
5 **AS DERRICK HOISTING FALLS** raise common block in steel tower, six pulling cables unroll half of pipe circumference on arched steel plate. For second half of unrolling operation, pipe must be reversed on straightening machine.

9 **UNROLLING IS COMPLETED (below)** by drawing free edge of pipe past crown of arch. Foreman signalling derrick hoist operator stops unrolling action when maximum straightening effect has been obtained.

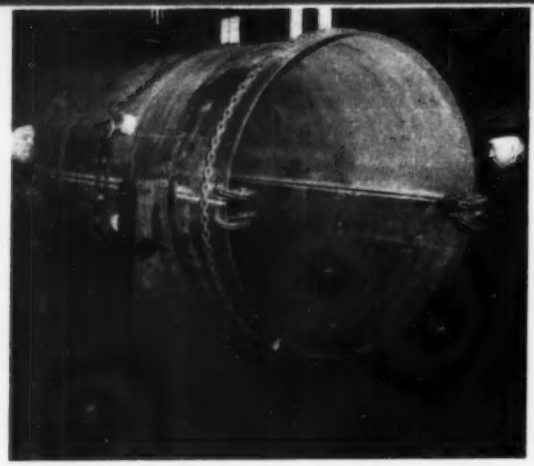
10 **DOUBLE REVERSED CURVE (right),** resembling profile of flying gull is produced by unrolling pipe on straightening machine, which unrolls 20 plates in 8-hr. day. Because of short-radius curvature remaining in center of this plate from 30-in. O.D. pipe, plate will be reversed in rolling mill to roll out center curvature and reroll to new 58⅞-in. I.D. shape. Thus outside of small pipe becomes inside of large pipe.







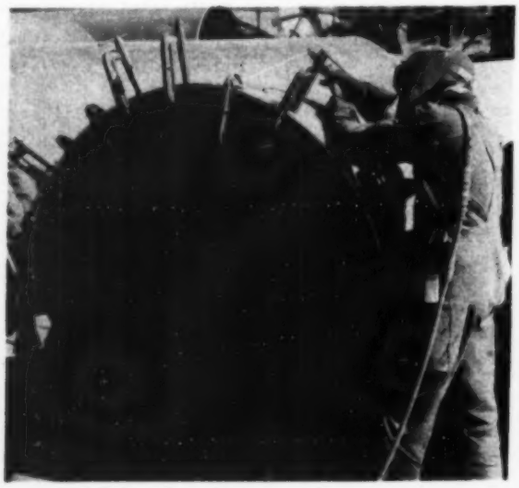
11 **STRAIGHTENED PLATE** is fed into Southwark rolls of 36-ft. 2-in. capacity to be rerolled to semi-cylindrical shape for large-diameter pipe. Prior to rolling, edges of plate are crimped in crimping block to new curvature desired, as edge crimping cannot be accomplished successfully in rolling mill.



12 **REROLLED SEMI-CYLINDRICAL PLATES** are fitted up in cradles, and edges are pulled into contact by turnbuckle girth chains. Edges of plates are not planed but are chipped if necessary to remove excessive irregularities. After fitting up has been accomplished as shown, large-diameter tubing is made up for later welding operations by tack-welding longitudinal seams at about 10-in. intervals.

13 **TO BACK UP** outside weld made later, hand operators first deposit inside weld in one light pass about ⅝ in. wide and ⅛ in. thick to close gaps between tack welds. Inside weld is made by hand only because shop's available automatic welding machines are needed for outside welds on pipe. No inside weld would be required if shop were able to obtain new copper back-up bar to replace old bar warped by long usage.

17 **INSIDE OF PIPE** is cleaned to same degree as exterior with Ingersoll-Rand rotary air brush, climbing pipe wall to horizontal diameter as it rotates.



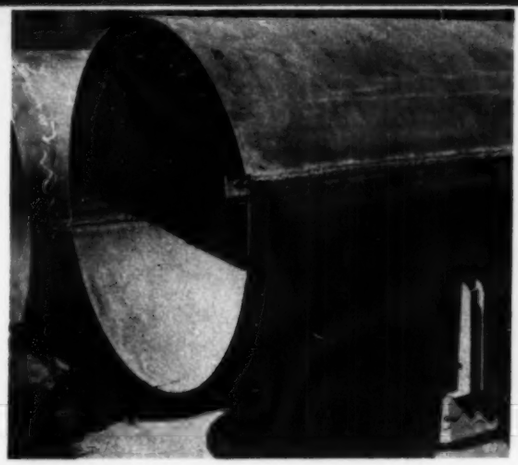
18 **STRING OF C-CLAMPS** fastens butt strap in place for tack-welding. Half-circle butt straps 5 in. wide, of same thickness as pipe metal, are welded to ends of pipe to reinforce joints in water main by providing three circumferential welds, two outside and one inside, at each connection.

19 **AFTER BUTT STRAP** has been tack-welded to outside of pipe continuous fillet weld is deposited along outer contact edge of strap. No weld metal is deposited along inner contact edge of pipe or at ends of strap, these areas being left clear for field joint welding.

22 **VERTICAL DIPPING (left)** of large pipe into electrically heated kettle 40 ft. deep equipped with automatic temperature control facilitates coating to 0.03-in. minimum thickness with RT-12 road tar, substituted with improved results for harder tars formerly used. Pipe is immersed cold; is allowed to remain in tar until steel is heated to same temperature as liquid (about 40 min. in winter and 30 to 35 min. in summer); is raised and lowered second time to assure smoothness in coating; and finally is raised progressively in 3- to 4-ft. increments to allow drainage and produce smooth coat of uniform thickness. Dipping is continued through two 8-hr. shifts to complete eight to ten pipe sections fabricated during day shift.

23 **WHITEWASHED ON OUTSIDE** and for short distance inside each end to protect tar-coated steel against heat absorption, pipe is ready for delivery to job after clevis pin holes have been filled with weld metal, here being smoothed by Cleveland air grinder. Tar coat and whitewash are applied to weld area by hand brushes.

14 **AUTOMATIC WELDING MACHINE** traveling on outside of pipe makes plain butt weld in longitudinal seam. Electric-motor-driven machine is Lincoln carbon arc unit using bare 5/32-in. low-carbon wire; rope of chemical paper fed automatically into hot arc generates gases which exclude oxygen from weld. Flux is brushed on pipe by hand in advance of welding. This machine closes seam at about 8 in. per min. with weld about 5/8 in. wide which penetrates through to back-up weld. Longitudinal seams in other pipes are butt-welded at about same speed by G-E metallic arc machine using 5/32- or 3/16-in. coated wire.

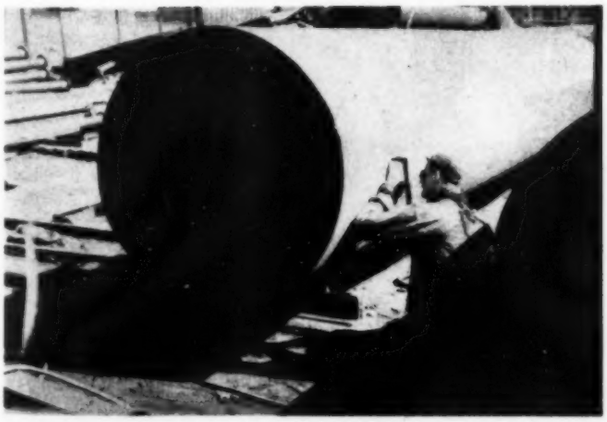


15 **FOR EFFECTIVE OPERATION** of automatic welding machines at start and finish of continuous beads, extension tabs are welded to pipe at ends of longitudinal seams, as shown here on completely welded pipe. Spattering to be seen on both sides of back-up weld inside pipe is result of flame-cutting original bar weld in 30-in. O.D. pipe.

16 **CLEANED BUT NOT POLISHED** by Cleveland air-driven rotary wire brushes, pipe is made ready for dipping in hot tar. Brushing is sufficient to remove last traces of mill scale remaining after straightening and rerolling of plates but is not so severe as to smooth surface enough to affect adversely maximum adhesion of tar coating.

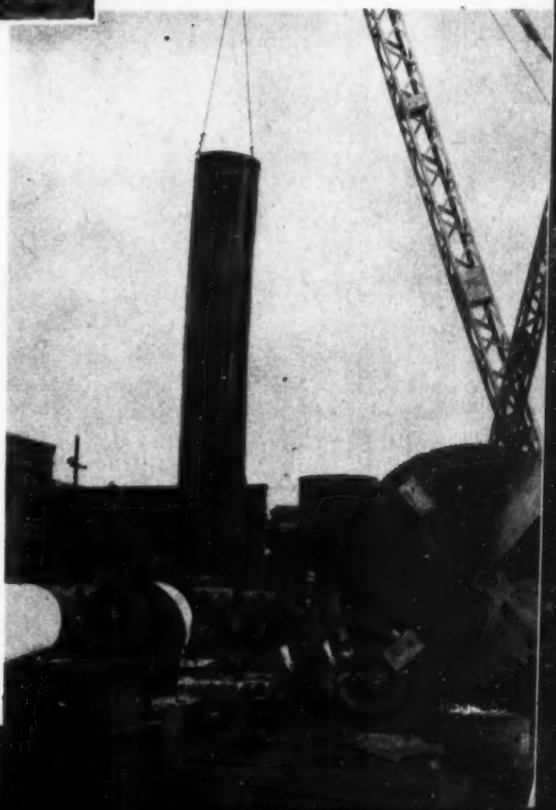
21 **FOR SAFETY** in handling pipe sections weighing up to 4¾ tons each into vertical dipping tank, clevises pinned through pipe wall replace bolted clamps.

20 **GROUP OF PORTABLE MOTOR-GENERATOR SETS,** comprising nine Lincoln machines in all, supplies current for yard welding of large-diameter pipe.



24 **ALL ANGLE BENDS** in pipe are fabricated at yard to avoid field fitting and welding of these joints. Gas torch cuts pipe on scribed line for angle connection.

25 **COMPLETED ANGLE BEND** coated with tar is removed by derrick from drying rack to be placed on ground for whitewashing and filling of clevis pin holes.



Contracting Firm Sows Seeds Now for...

POST-WAR JOBS

Turner Construction Co. Counsels Industrialists on Prospective New Building and Modernization Projects for Peace-Time Era.

ALERT, FARSIGHTED INDUSTRIAL AND COMMERCIAL MANAGEMENT is already making plans for plant improvements after the war. Established construction firms have a vital part to play as stimulators and advisers of this future planning, collaborating with owners' architects and engineers. These facts are the outstanding general observations to be drawn from the actual experience of the Turner Construction Co. during the last twelve months.

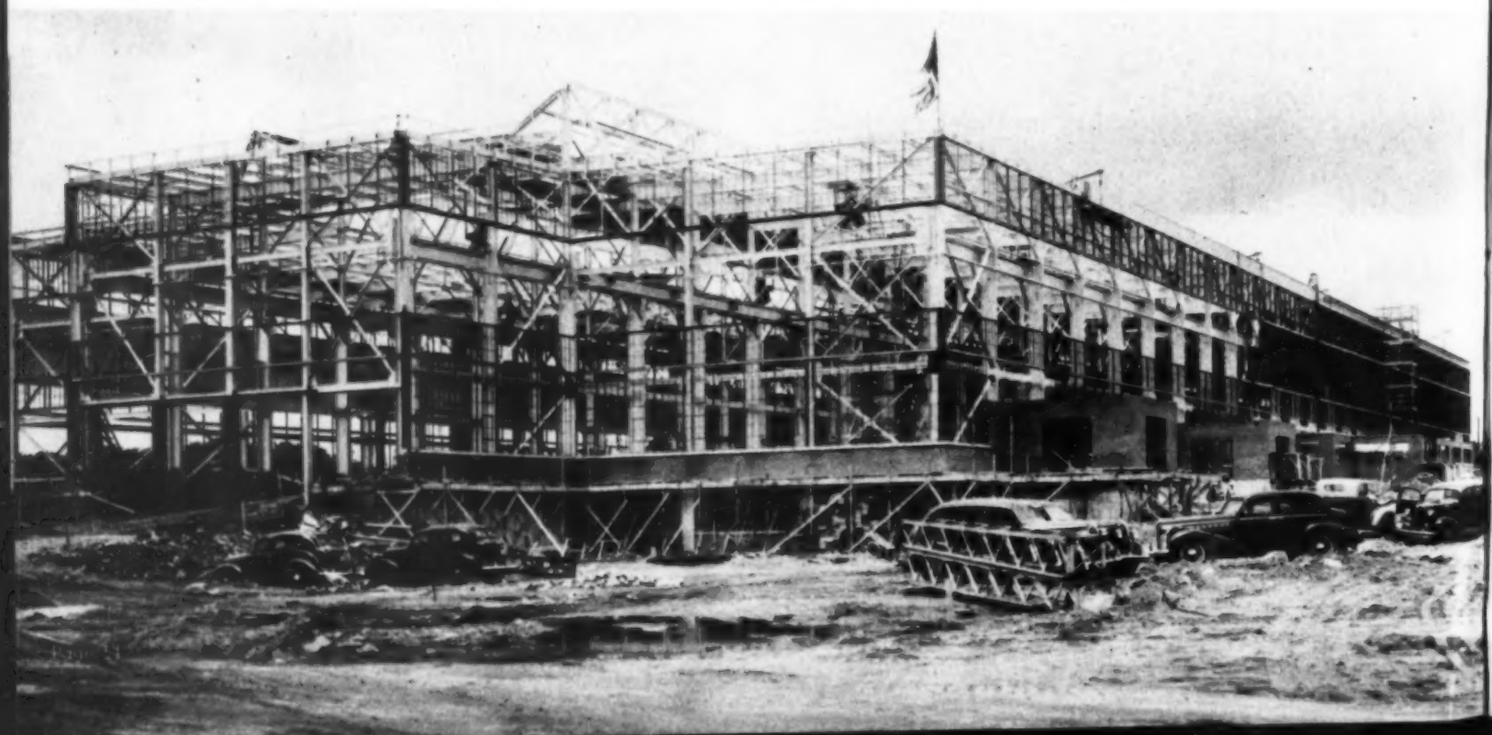
Stimulation by the Turner Construction Co. of post-war thinking on the part of industrial management contains nothing of a spectacular or sensational nature. The activities undertaken by the company are of a kind that might have suggested themselves to any prudent, thoughtful contractor. They follow conservative lines and, as a consequence, are likely to produce practical results.

The Seeds Begin to Sprout

Evidence of immediate results, showing promising potentialities for future business, already is on the table. The company has been called upon to give cost estimating and structural advice on many millon dollars worth of proposed industrial and commercial building. At the New York office alone, assistance has been requested and advice has been given in preliminary studies of future structures for manufacturers of carpets, paint, macaroni, clothing, machine tools, soft drinks, miscellaneous metals, soap, textiles and caskets, as well as for a hotel owner, a chain store organization, a meat packer, and a general merchandise wholesaler. Similar requests are being handled by the Boston and Philadelphia offices. It is conservative to say that the company today is providing building advice to more than 20 owners interested in post-war construction.

A wide variety of industrial and commercial enterprises is represented in the list of prospective projects. Diverse though their business in-

HEAVY STEEL FRAME (below) and large expanse of steel sash mark assembly building erected by Turner forces for machine tool manufacturer.



A BUILDER LOOKS AT POST-WAR PROBLEMS

Quoted from a statement by J. Archer Turner, president, Turner Construction Co., and vice president, New York Building Congress:

"What are the prospects immediately following peace? They will depend entirely upon the energy and wisdom we now apply to the planning for such a period. While many think the remarks Henry Kaiser made at the dinner of the National Association of Manufacturers in New York earlier this year were visionary, in my opinion without such foresight and resourcefulness as shown by him and others we may find building at a complete standstill when war orders cease.

"Certainly, if the standards of living to which we have been accustomed over the last 25 years are to be maintained, there will be a tremendous demand for those things which have been denied the buyer during the war period. This demand will call not only for such goods as refrigerators, automobiles, and the like, but also for a great volume of adequate housing, and the savings to buy these things will be in the hands of the buying public.

"Government, business and labor must join to see that the wheels of industry are kept moving. These three groups must have confidence in one another as well as confidence in the future. Plans made during the war period and carried out immediately upon the coming of peace can provide both public and private work of sufficient volume and importance to make for adequate employment. Such planning need not detract from the prosecution of the war, but it must be placed in the hands of government and business representatives who believe in our long-established economic system and the encouragement of individual initiative.

"The immediate problem of the builder is to apply himself to the discovery of improved methods of construction, new materials, and more efficient management. The price factor will always be paramount.

"Post-war needs of our buying public must be intelligently determined, and this study must take into consideration foreign markets. When the potential market is soundly appraised, surely plans can be made with Government support to assure that the wheels of industry will not be permitted to lag or to stop. We must remember that it requires a lot less energy to keep a moving locomotive going than to start it.

"A broad program of planning should receive the wholehearted support of the building, architectural and engineering professions. The Building Congress of New York has already voted its support."

terests may be, it is instructive to note that all of these prospects are engaged in private enterprise. This fact is in accord with the Turner Construction Co's own view of post-war construction. Except during the stress of war emergency, private industry and private owners always have furnished the bulk of our construction volume. This condition is both normal and healthy in a free enterprise economy, and it constitutes a relationship which must be revived promptly after the war if the free enterprise system is to thrive. In line with this basic thinking, the company is directing its efforts to develop construction in the field of private ownership.

SHOWING THE BOSS how he is going to give $6 worth of construction value at a price of $5 per sq. ft. to an owner who wants quick job on 20,000 sq. ft. of additional space, HARRY A. WARD **(left)**, vice president, ace engineer estimator and chairman of company committee charged with making studies and plans for future business, including post-war, points out new idea in economical roof framing to J. ARCHER TURNER, president, Turner Construction Co.

Policy on Public Works Planning

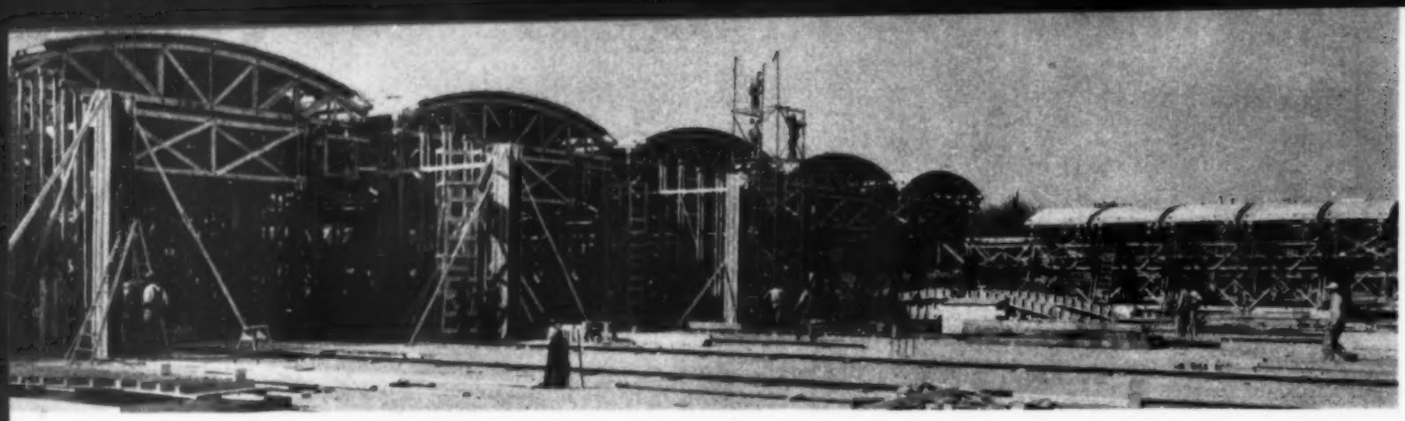
Many public works have been built by the company in the 41 years of its existence, during which it has constructed more than $660,000,000 of contracts. Opportunity to bid on public works projects will be welcomed by the company after the war, but for the present it is leaving the stimulation of post-war public works planning to larger associations and organizations better fitted to influence that planning in the proper direction. The company is doing its part in this work in several ways. One of its most important contributions is in giving substantial support and constructive suggestions to the post-war program of the Associated General Contractors of America, which directs its attention to both public and private work.

How does the company go about the business of stimulating plans for post-war construction? The heart of the operation is a small group of company executives who devote their whole attention, now as in the past, to developing new business. These men maintain contacts with former clients and with prospective customers. They call regularly on owners, engineers and architects.

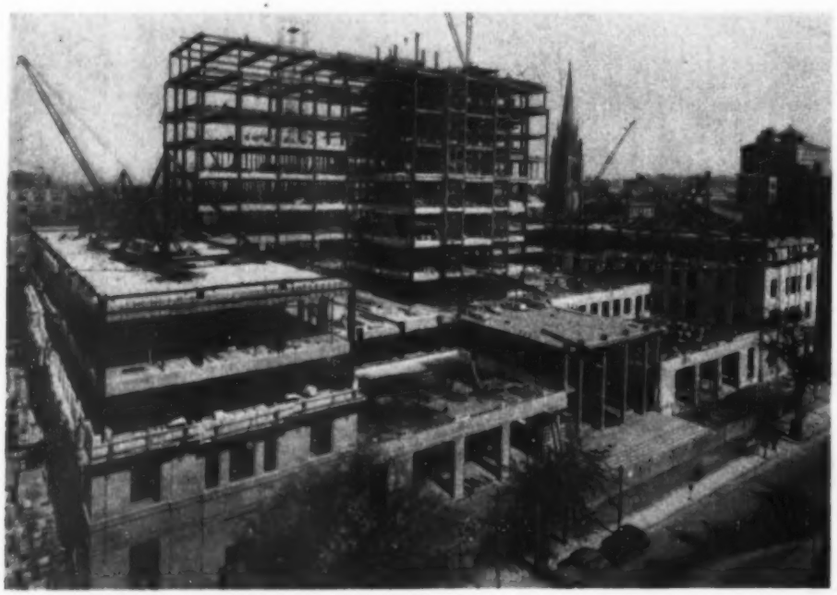
In making such a visit today, the caller is likely to be greeted by the words: "Why are you calling on me? Don't you know that it is against the law for me to put up a building unless the government orders it? You're wasting your time in talking to me." Long thinking in terms of post-war construction has fitted the solicitors to accept such a reception and turn it to advantage. Largely through the work of these men in selling the wisdom of planning now for post-war construction, a number of owners have shown definite interest leading to requests for advice.

One thought-stimulating comparison used by the solicitors to awaken interest in advance planning for post-war construction calls attention to the condition which existed at the end of the first World War. To one who has any faith in repetition of business cycles, the illustration is thought-provoking. For about nine months following the end of the last war, there existed a buyer's market in which it was possible to get prompt deliveries of materials and equipment at reasonable prices. Immediately after this lull came the first post-war boom, during which it was impossible to get prompt deliveries at any price.

A similar situation could occur at the close of the present war. Hold-up orders may go out from the Government to all its contractors within a

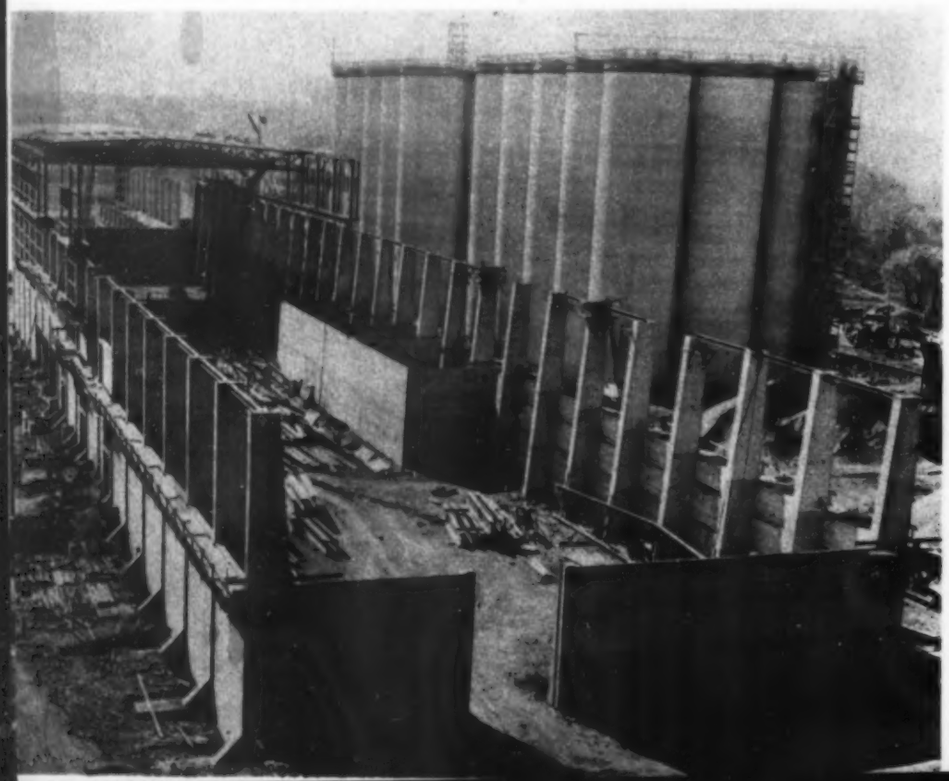


MULTIPLE-BARREL CONCRETE ROOFS for 3,600,000 sq. ft. of manufacturing space are formed by series of traveling wood-frame arches (called umbrella-type forms) on job built by Turner in association with another contractor.



HANDSOME COMMERCIAL BUILDINGS of steel-frame, concrete-floor design in many cities offer evidence of Turner craftsmanship.

MODERN PORTLAND CEMENT PLANT (below) rapidly constructed by Turner organization includes cylindrical cement-storage bins, concreted continuously in sliding forms, and rectangular rock-storage bins with tall concrete craneway piers which also support steel roof framing.



few hours after combat ceases. Some time will elapse before the manufacturers can convert their war-production machinery to the making of automobiles, refrigerators and other consumption goods. During this interval, raw materials demands on the part of the manufacturers will be small, and the materials will be available for construction. Owners who have completed their construction plans in advance will be in a position to take advantage of ample materials, ample labor and low costs.

Another Possibility Considered

Preliminary studies undertaken now will be just as effective if the nation happens to enter a pre-dawn zone in which our armed forces will still be fighting in the Pacific area after victorious conclusion of the European conflict. It is possible that in such circumstances some materials and manpower might be available for what we now call non-essential construction. In fact, economic and employment conditions at that time might make it necessary to start construction of works having no connection with the military effort.

Arousing Interest by Letters

Another incentive to advance planning is employed by the construction company. During the last year, J. Archer Turner, president, has sent out a number of letters to the company's clients and prospective customers. These letters point out the advisability of beginning study now for post-war construction. A typical example is the letter of March 1, 1943, which accompanied a picture of 1942 Turner City, a composite photograph of all structures, except those excluded by censorship, built by the company in the last year.

After mentioning the year's work

(Continued on page 132)

JOB oddities

STALAGMITES, brittle, hollow centered deposits caused by water seepage with attendant absorption of lime, and similar to those in Carlsbad Caverns and Mammoth Cave, are found in 1,392-ft. long discharge tunnel of Los Angeles Harbor steam plant. W. E. GABLEMAN (kneeling), C. P. GARMAN, C. G. WATSON, and V. LANKOVSKY, of the Los Angeles Municipal Department of Water and Power, inspect their find.

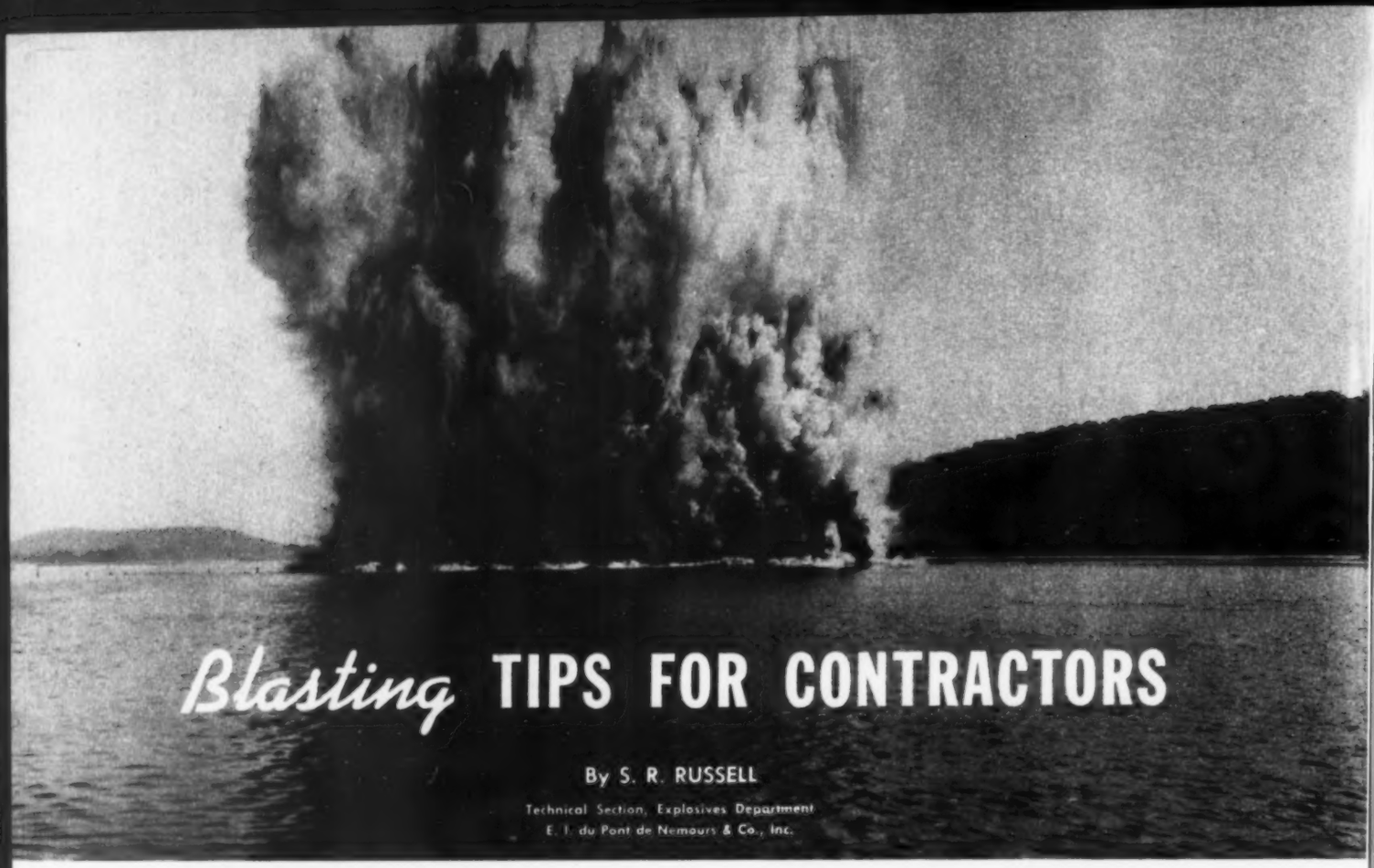
SIXTY-TON DIPPER (below) of Marion electric shovel, in service 24 hr. per day speeding coal for wartime delivery, strips close to million tons of earth per month from fields near Middlegrove, Ill., for Midland Electric Coal Corp., in open-pit mining operations. General Electric motors, generators and new amplidyne control equipment enable shovel to scoop up freight-car load of earth in 50 sec.

FIERY NIAGARA spills from massive steel pedestal being fabricated by arc-welding at Bentley Welders, Syracuse, N. Y. Sparks fall from intensely hot electric arc fusing metal with aid of Lincoln equipment.

PORTABLE RUNWAY of wire mesh reinforced with steel rods is used by R.A.F. in England for smooth landings and take-offs under all weather and ground conditions.

British Combine Photo

HOUSE EXPRESS (below) is fashioned from obsolete LeTourneau trailer pulled by Caterpillar tractor to move 20-ton steel building to new location. Half-mile journey includes 8 or 9 percent grade.



Blasting TIPS FOR CONTRACTORS

By S. R. RUSSELL

Technical Section, Explosives Department
E. I. du Pont de Nemours & Co., Inc.

SUBMARINE BLASTING requires special technique and explosives of water-resistant type. Here, bed of Susquehanna River near Highspire, Pa. is blasted to provide trench for pipe line.

EXPLOSIVES ARE TOOLS just as shovels or drills are tools and some routine methods of using them are the same for all jobs. Nevertheless, for the average small contractor who may build a highway through varying kinds of ground this month, and start construction of a dam next month, many explosives problems seem puzzling. Few general rules can be given for explosives, since each job must be studied separately. Some practices known to large users of explosives, however, are of value to the general contractor.

In this article contractors will find Practical Pointers on . . .

WET WORK • MISFIRES
MUD CAPPING • DAMAGE SUITS
BLASTING MATS • STUMP BLASTING
DELAY BLASTING CAPS
FILL SETTLEMENT

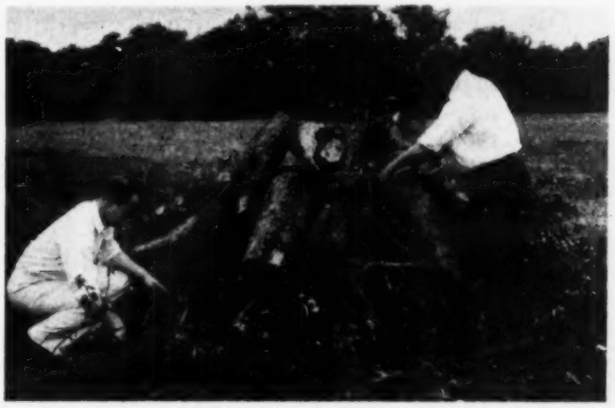
Most important decision concerning explosives is choice of powder for the job, for herein money can be saved. Explosives should be considered with relation to the drilling in order to get lowest cost for the two combined. A contractor using a 40 percent gelatin, or a low-density powder, can sometimes sufficiently reduce drilling costs by use of higher-strength explosive to overcome the higher powder cost. This is particularly true in hard rock. Greatest efficiency is obtained by maximum spacing of holes which will

DYNAMITE IS LOADED (below) from barge through pipe to blast ditch for pipeline under river. Engineer at left keeps record of each charge. Hole at right with fuse protruding has been loaded.

MUDCAPPING (below) is quick and simple method for cracking boulder, but should be used only when drilling equipment is not available and when noise and concussion will not disturb occupants of nearby inhabited buildings.

SUBSIDIARY BLASTING as practiced in quarry illustrates approved method of cracking boulders by drilling and blasting with least possible noise and concussion. Dynamite is being tamped into hole in center rock. Rock in foreground has been drilled and loaded.

BLASTING MAT of wire rope is essential safety measure to prevent damage by flying fragments of rock in built-up city areas.



CRIMPING a stump blast prevents damage to nearby buildings. Logs and brush are piled over stump and chain is looped around logs. Brush prevents small missiles from flying out between logs.

DITCH BLAST at Seaford, Del. nylon plant of du Pont Co. is done through difficult stump and root growth **(1)** Holes for blasting in wet soil are put down with core punch bars **(2)** Relief ditches are shot on each side; **(3)** center section shot later. Side ditches are each loaded with 3 lb. of ditching dynamite every 2 ft. This method throws more material clear of ditch.

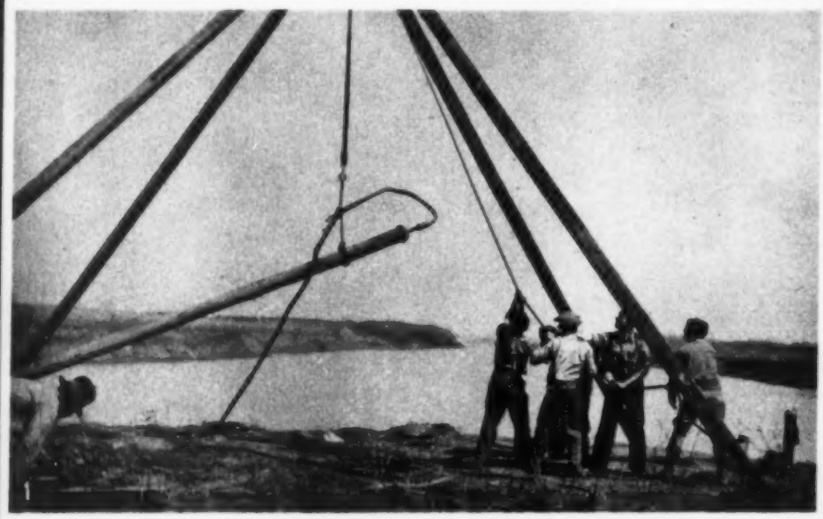
NEW RIVER CHANNEL is blasted across Giles Bend in Mississippi River above Natchez, Miss. Blasting 1½ mi. of channel takes 1,500 lb. of ditching dynamite.

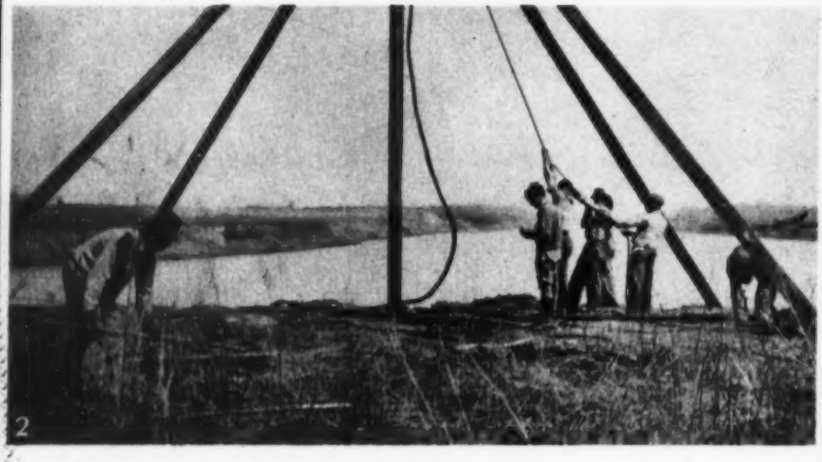
still reduce the rock to a size small enough to be handled by the machines in use. Advice of explosives technicians or experimenting with various strength powders will indicate maximum spacing of holes for a given strength explosive.

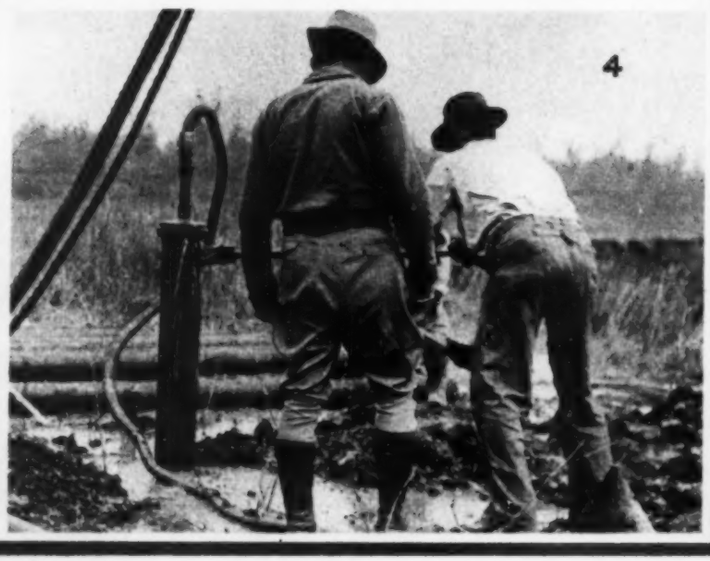
Wet work limits choice of powders to those with some measure of water resistance. Gelatin dynamites have greatest water resistance, semi-gela-

(Continued on page 124)

STRAIGHTENING MISSISSIPPI RIVER BANKS (below) is accomplished by blasting from holes jetted down to receive explosive charges. **(1)** Frame is set up and pipe raised prior to jetting. **(2)** Jetting begins with pipe in place. Man in foreground is starting holes for pipe with 8-in. post-hole auger. **(3)** Pipe is jetted down to within 10 ft. of top. Man with pipe wrench twists pipe to speed jetting. **(4)** Operation is nearly complete. Shot uses 2,415 lb. of Nitramon, 300 lb. of du Pont 60 percent special gelatin, 5x16, and 1,000 lb. du Pont ditching dynamite.







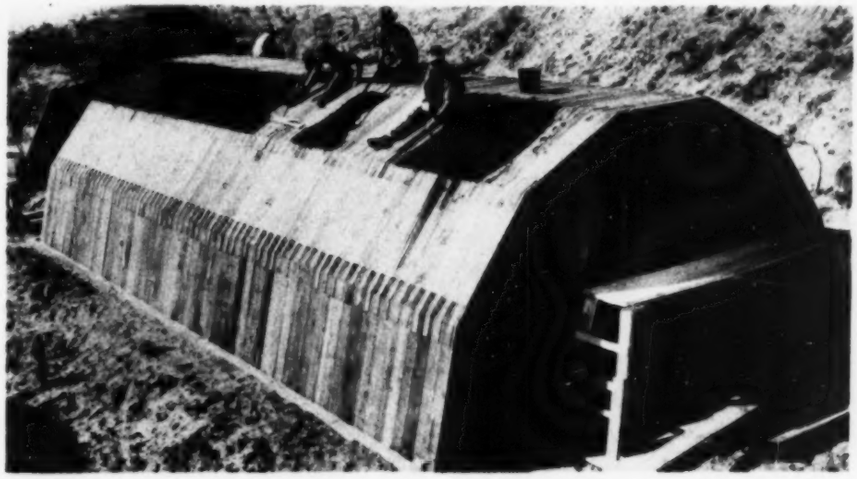
Tons of Steel Saved by Using

All-Wood Ammunition Igloos

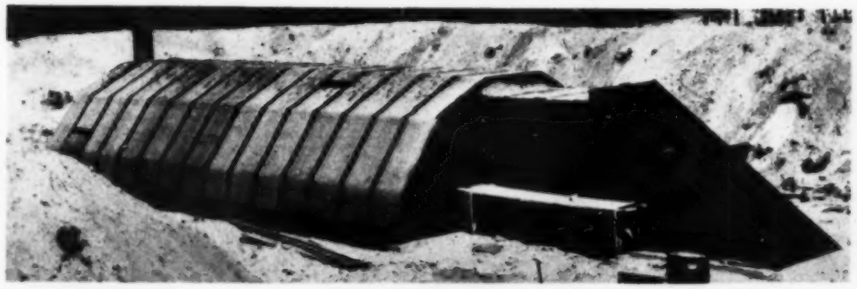
OBVIATING NEED for critical materials, seven-sided ammunition igloo is constructed entirely of wood mounted on concrete base.

TUNNEL ENTRANCE and arch barrel are erected simultaneously. Overall length is 40 ft., span 20 ft. and rise 9⅔ ft.

DOWELLED INTERLOCKING JOINTS fasten members into strong continuous arch. Using only short lengths of wood, longer and heavier timbers are saved for other war uses.



FIRST COAT OF ASBESTOS FIBER ROOF COATING is applied to arch barrel. Tunnel entrance and barrel are completed, with only rear wall remaining for erection. Strutting on interior holds crown in proper position until backfill develops side-pressure to make arch self-supporting.



ALTERNATE LAYERS of roofing paper and asbestos fiber roof coating comprise 3-ply waterproofing. Igloo here is completed and ready for backfill.

DRAGLINE COVERS IGLOO (below) with earth backfill which is subsequently fine-graded and seeded, leaving only tunnel entrance and ventilator exposed.

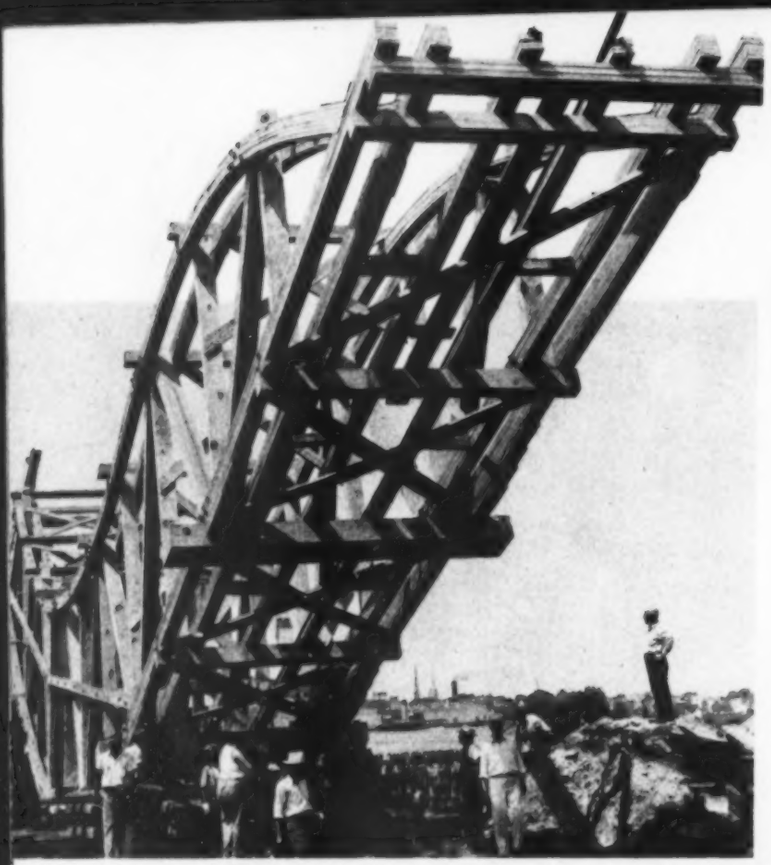
CONFRONTED SIMULTANEOUSLY with a wartime need for additional ammunition magazines and a wartime shortage of the materials ordinarily used in their construction, the Army has made use, at a midwestern site, of the all-wood "igloo" developed by Armco Drainage & Metal Products, Inc. The company's construction division contracted for complete erection of 14 igloos including foundations, wood structure, backfill, and barricades. The design was originally developed for an all-wood emergency drainage pipe and proved so successful that the design was adapted to the construction of the ersatz igloo.

The timber igloo follows the same line as the standard reinforced concrete ammunition igloo described in *Construction Methods* of August, 1941. To save steel and concrete, the

(Continued on page 138)

HOW *They Did It*

CONSTRUCTION DETAILS *For Superintendents and Foremen*

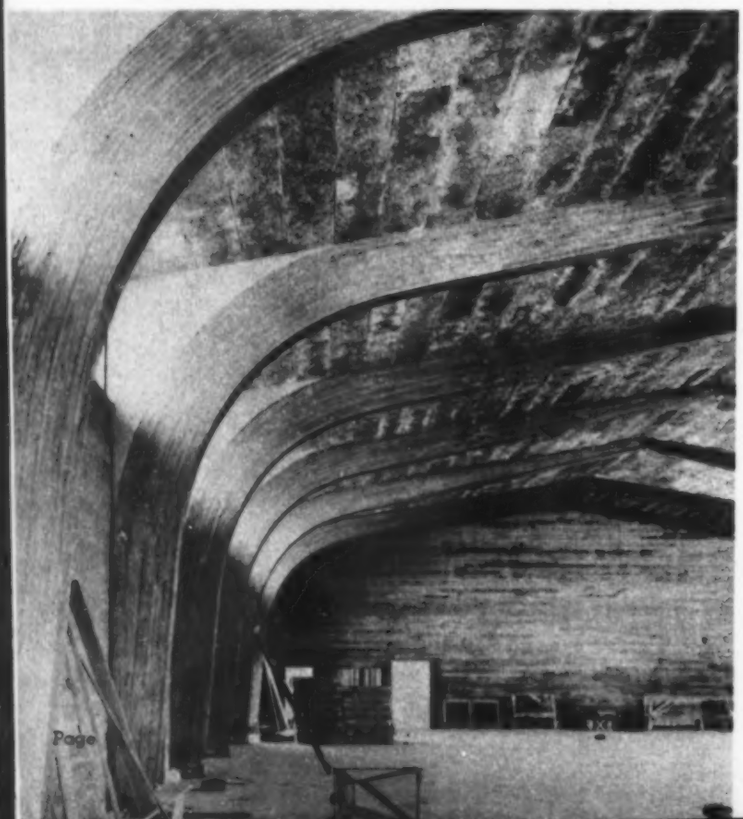


CURVED LAUNCHING CRADLE, consisting of pair of laminated timber trusses designed by Walter H. Taylor III, director of public works for Norfolk, facilitates assembly and laying of 30-in. flexible-joint cast-iron water main crossing Elizabeth River near Norfolk, Va. A. W. Baldwin, of Norfolk, was contractor. Pipe sections 12 ft. long are joined in cradle suspended between barges above water 60 ft. deep. When barges are moved, pipe slides from cradle into previously excavated trench at angle preventing greater deflection than joints can absorb.

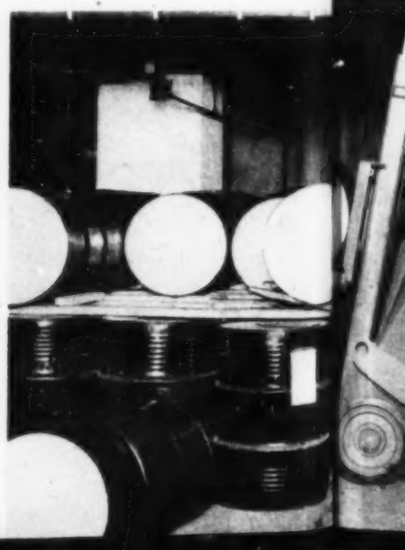
Norfolk, Va. Ledger Dispatch Photo

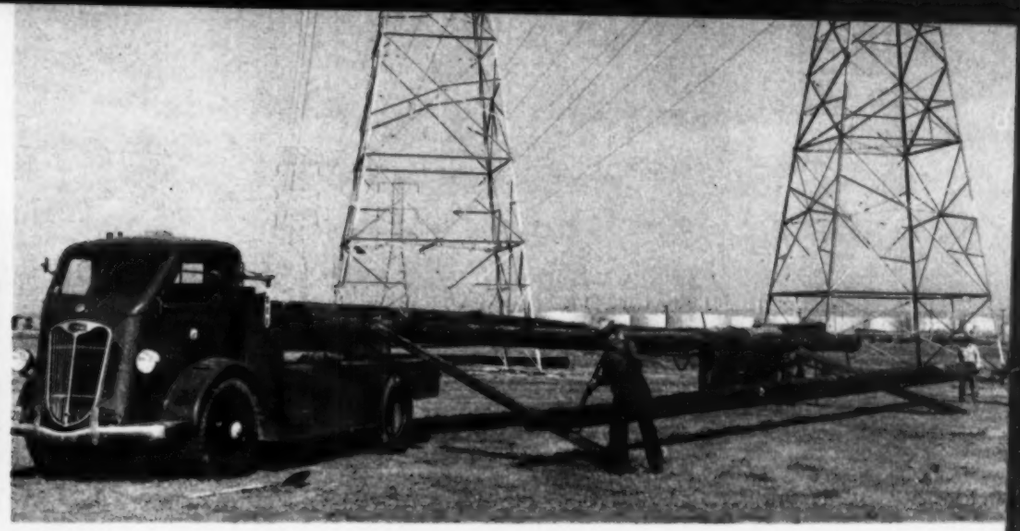
TAR COAT AND ASBESTOS WRAPPING are applied to outside of 24-in. steel pipe section to protect surface from soil corrosion and electrolysis, as oil line is rushed to completion between Texas and Eastern Seaboard. Coating consists of hot coal tar enamel application, followed immediately by spiral winding with asbestos-felt protective wrapping put on by same machine.

THREE-HINGED LAMINATED TIMBER ARCHES (below) with 70-ft. span support roof of new recreational center at West Coast Navy yard built by H. F. Miller of Bremerton, Wash. Six arches are spaced 18 ft. on centers and rise to 28-ft. height at center. Arches have 14-in. width from spring line to crown, with thickness varying from 19 in. at floor to 38 in. at eaves and 9 in. at center. Ribs are built of 1x6- and 1x8-in. boards glued with Laucks self-bonding casein glue.

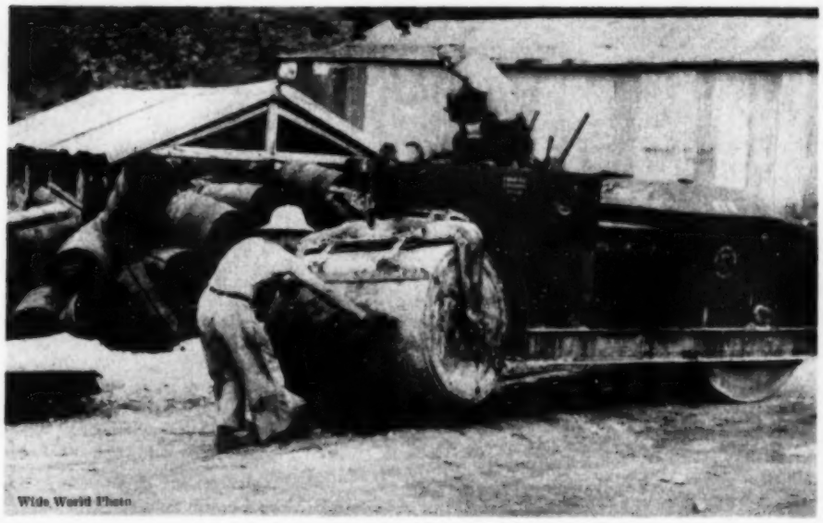


METAL FOOTGUARD (below), developed by Safety and Traffic Division of Michigan's Wayne Country Road Commission, reduces foot injuries among pneumatic hammer operators caused by slippage of hammer drills.



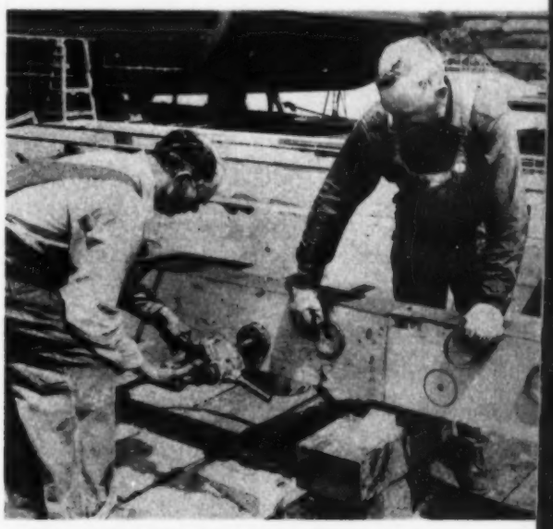


LOADING 75-FT. UTILITY POLES, each weighing 2,800 lb., is accomplished by Los Angeles Bureau of Power and Light crews using motor-driven winch from which rope is passed around pole. As motor is started, pole is rolled up skids on to truck and dolly outfit. At left, workmen are jockeying poles into position on dolly with aid of lumberman's peaveys.



Wide World Photo

TO SALVAGE METAL for use in surfacing bulkhead somewhere in the South Pacific, Navy's Seabees slit gasoline drums and flatten them into sheets with road roller.



SPLIT-RING TIMBER CONNECTORS are used in building Army barges at West Coast shipyard. Circular grooves to receive metal rings at bolted joints are formed by air-operated drill with special cutting head.

Acme Photo

FOR STACKING METAL DRUMS (below) Towmotor lift-truck is equipped with forks which pick up load and raise it to proper height for unloading.

CONCRETE AIRPORT RUNWAYS (below) at Peoria, Ill. are paved in alternate lanes 25 ft. wide. Project occupies 510 acres and used 230,000 sq. yd. of concrete in runways, taxiways, and aprons. Runways of 8-6-8-in. cross-section are 150x4,400 ft. and 100x3,700 ft. Project was supervised by R. M. Johnson, airport engineer.

TOTE-ROADS are first built to carry equipment and material from railroad to job site. Here Allis-Chalmers tractor hauls trailer-load of supplies through muck.

SIDE DITCHES (below) are excavated by dragline through swamp and muskeg sections.

Last Gap Closed

In Canada's 4,610-Mi. Coast-to-Coast Highway

By E. H. MURRAY
Department of Highways
Ontario, Canada

DESPITE A COMBINATION of conditions that made construction difficult—inaccessibility of the site, scarcity of suitable soil material, lack of transportation, heavily timbered terrain and freezing weather—fifteen road-building contractors last fall, working between Hearst and Geraldton in the Province of Ontario, completed the final 153-mi. gap in Canada's first transcontinental highway, a 4,610-mi. coast-to-coast route of strategic importance in the Dominion's war effort. Buried under a 4-ft. blanket of snow since construction was finished late last year, this closing section of the highway was opened to traffic this spring.

Construction of a national coast-to-coast highway had long been contemplated, but was slow in realization. Gradually throughout the provinces, existing highways fitting into the cross-country plan were extended, here and there gaps were filled in, until two years ago Canada had one highway extending eastward from the Pacific and another westward from the Atlantic, separated only by a short gap in northern Ontario. Military strategy demanded that this last gap be closed.

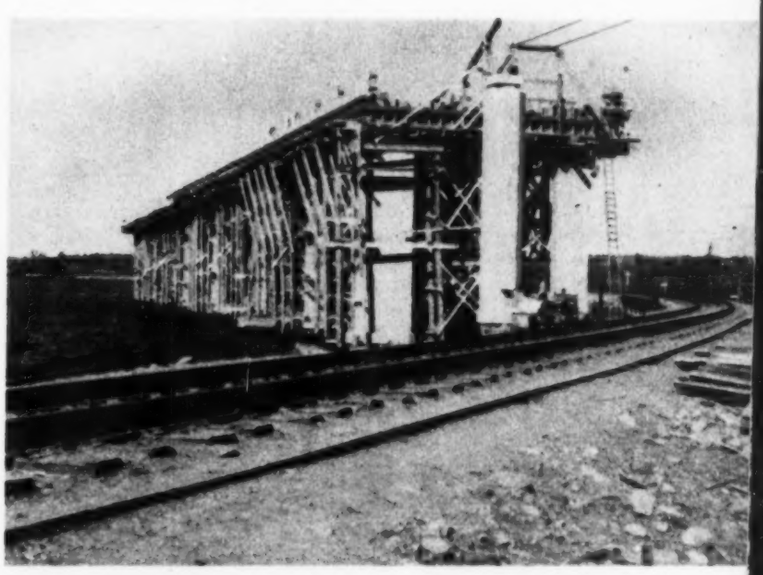
In mid-winter of 1940 the 15 contractors entrusted with the job of breaking down this last frontier, began moving equipment into northern Ontario to forge the final link in the 4,610-mi. highway. The country here was heavily timbered, uninhabited, entirely devoid of any roads or trails, and covered by 4 ft. of snow. The route of the highway itself, except at its eastern and western terminals, lay many miles south of the nearest railway, the supply base for all operations.

The contractors set about building more than 100 mi. of tote-roads in a feverish attempt to get to their various

PORTABLE SAWMILL is set up along route to cut and frame timber for bridges and culverts.

RAINS AND THAWS dissolve tote-roads into soup, adding to transportation difficulties. Highway location is laid out along greater part of route through heavily timbered terrain.

ROADWAY RESEMBLES CANAL as summer rains impede progress during few available working months between spring break-up and winter freezes.



OVERPASS IS BUILT to carry highway across railway at Long Lac.

COMPLETED HIGHWAY (below, left) with 30-ft. surfaced roadway forms last link in Canada's 4,610-mi. "Main Street."

MUSKEG STRETCHES (below) pose special problems of equipment, spoil disposal, and fill.

POWER SHOVEL loads sand in borrow pit for truck haul.

FILL MATERIAL from widely scattered sand and gravel pits is deposited on subgrade by trucks.

CRIBWORK TIMBER for bridge construction is peeled by workmen.

MUSKEG IS REMOVED (below) from roadbed by blasting, excavation, or scraping and channel is filled with sand.

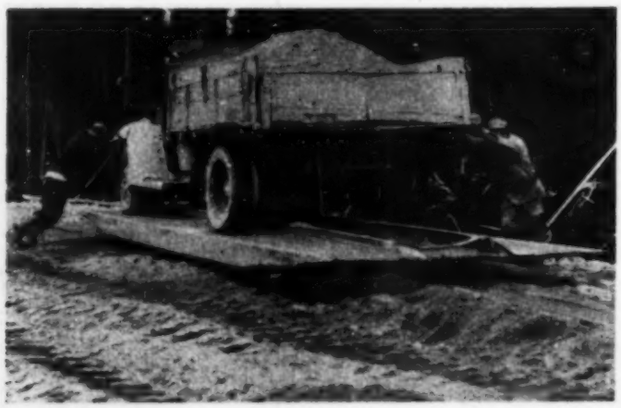
BULLDOZER levels fill on roadbed.

projects, erect camps, and haul in equipment and supplies before the spring break-up. However, the break-up came early that year and caught them with the last part of their supplies still at the sidings. Having reached the site of their operations, they were forced to sit back and watch the terrain, composed predominantly of muskeg, turn into a vast quagmire as the frost came out of the ground. Tote-roads simply dissolved into soup, and it was a common sight to see tractors wallowing through mud and muskeg mile after mile with only tops of the treads showing above the ooze as they hauled completely submerged Minnesota sloops. Planking and corduroying of the tote-roads was carried on until, finally, fair hauling roads emerged from the morass.

By July the ground had dried sufficiently for large-scale operations and, following a line mapped in detail by aerial survey, the job was tackled with a vigor designed to catch up with the time lost. All through that month a record-breaking pace was maintained. Then came August and the rains. From August 3, until the freeze-up in mid-October it rained part of almost every day. But for 60 mi. east from Geraldton, and 45 mi. west from Hearst, the highway had been constructed to grade.

Work progressed during the second winter, but again wet weather slowed down summer operations and announcement of the job's completion was postponed from month to month. Only late last fall, just before the first

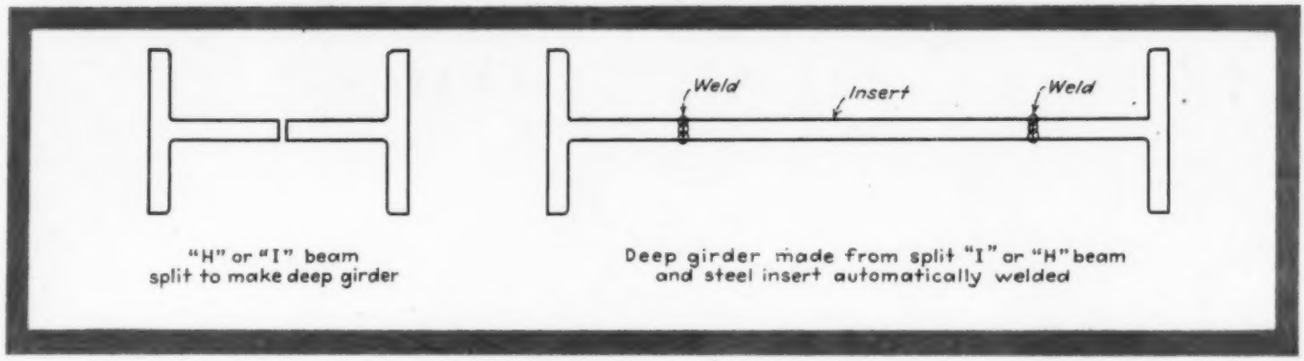
(Continued on page 139)



TURNTABLE expedites handling of trucks as they deliver fill material

Deep Girders Fabricated

By Arc-Welding Web Plates Into Split H- or I-Beams



NEW TECHNIQUE FOR FABRICATING deep steel girders by inserting additional sections of web plate into split standard-size H- or I-beams has removed a handicap from architects and designers by no longer restricting their designs to standard rolled members. The Dravo Corp., of Pittsburgh, used this new development, involving automatic carbon arc welding in fabricating deep girders for U. S. Navy equipment.

A standard H- or I-beam is split and the desired size web plate insert is welded into place by the Lincoln Electric Company's "electronic tornado" automatic welding head mounted on a post arrangement. The head is lowered into working position by the rack on the supporting post. Filler wire feeds over the top of the head from a reel and into the arc formed by the carbon electrode in contact with the work. Automatic welding as a substitute for hand welding saved production time and cost.

Shown here in Fig. 3, a 14-in. I-beam with a 12-in. flange has been split and a $\frac{3}{8}$ x 28-in. plate inserted in the web to form a deep girder 10 ft. long. Joints are then welded from both sides. The same principle is used in Fig. 4 where a $12\frac{1}{2}$ x $\frac{7}{8}$-in. H-beam with $15\frac{1}{2}$-in. flanges is being converted into a deep and heavy girder of 67x$\frac{7}{16}$-in. web by insertion of a $\frac{7}{16}$x 54-in. plate.

Fig. 1 . . . **TAILOR-MADE DEEP GIRDERS** are fabricated by Dravo Corp. from standard I-beams and H-beams by splitting beams and inserting web by automatic arc welding.

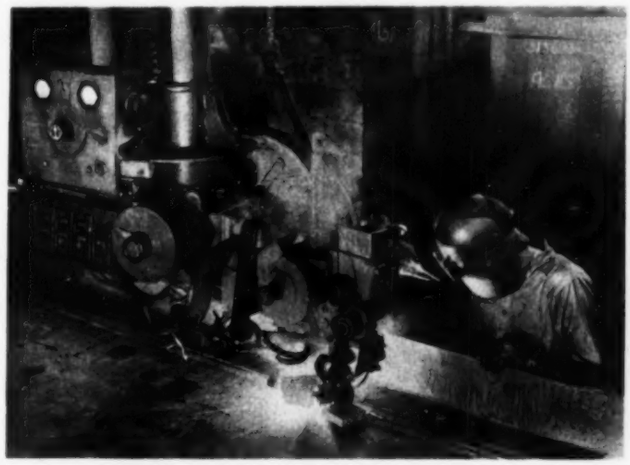


Fig. 2 . . . **AUTOMATIC WELDING HEAD,** supplied by Lincoln Electric Co., is mounted on post. Head is lowered into working position by rack arrangement. Filler wire feeds over top of head from reel into arc.

Fig. 3 . . . **SPLIT I-BEAM** is deepened by insertion of $\frac{3}{8}$x28-in. web plate. Joints are welded from both sides.

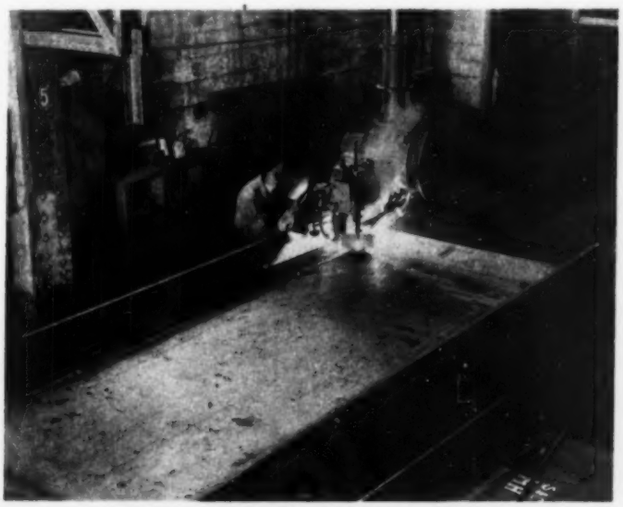


Fig. 4 . . . **EXTREMELY DEEP AND HEAVY GIRDER** is fabricated by insertion of 7/16x54-in. plate into H-beam with $15\frac{1}{2}$-in. flanges originally $12\frac{1}{2}$ in. deep with web $\frac{7}{8}$ in. thick. Girder shown is 35 ft. long and 67 in. deep.

Navy's Seabees

Construct Island Base in Southwest Pacific Combat Area

LONG AFTER SUNDOWN men operate cranes from barges to unload equipment and supplies on shores of Southwest Pacific island base.

All Photographs U. S. Navy Official

SAND-BAG FOUNDATION (below) for temporary ramp is being placed by Seabees for bringing equipment from landing barges. Boys in the water seem to have best of this detail.

SOMEWHERE IN THE SOUTHWEST PACIFIC the Navy's Seabees, so nicknamed from the phonetic pronunciation of the Construction Battalions' initials and trained both to work and fight, as described in *Construction Methods* for November, 1942, are building an unidentified island base to serve the needs of United States military and naval forces in combat areas overseas.

With a yen for adventure, proficiency in their jobs, and an urge to get into the fight, these men have been recruited from the country's construction specialists—superintendents, foremen, electricians, drillers, automotive repairmen, blacksmiths, carpenters, divers, riggers, welders, telephone men, truck drivers, pipe-

JUNGLE UNDERGROWTH is cleared by tractor-bulldozer from what will be airfield a few days hence.

IN VARIED STAGES (right) of dress and undress, Seabees build timber wharf to facilitate landing of battalion's supplies.

fitters, painters, equipment operators and steel workers. After proving their technical qualifications during a tough training course, these men are enrolled in the Naval Reserve to operate under the Civil Engineer Corps of the Navy's Bureau of Yards and Docks.

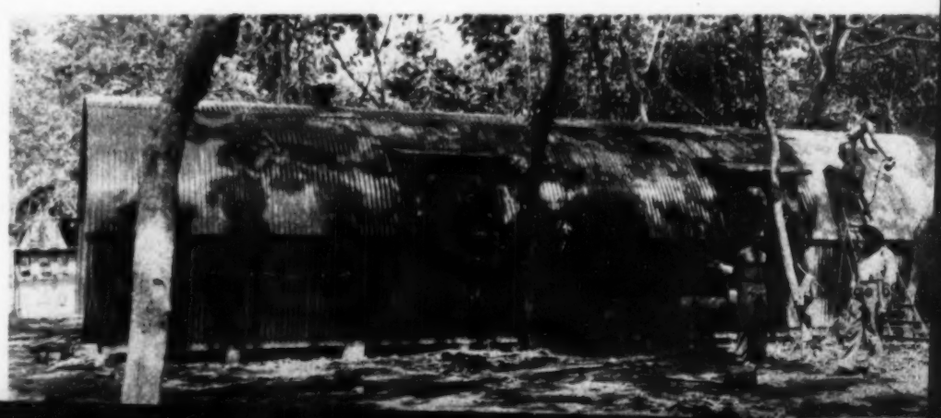
The Pacific campaign is one of amphibious warfare, essentially naval, with bases playing a vital part. Ships with bases at their disposal are the ships that count. Function of the Seabees is to provide these bases for supporting and maintaining the fleet on the surface, beneath the surface, and in the air. Construction and maintenance of these bases may often be in combat areas. The work may have to be carried on under fire. It is for such contingencies that the Seabees have been especially selected and trained.

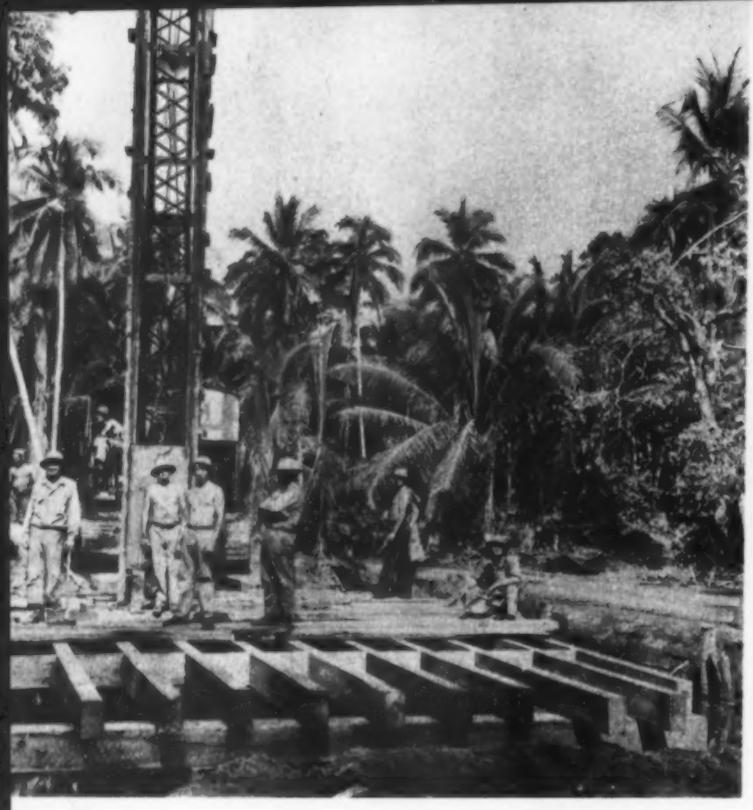
Construction workers have fought battles earlier in this war. When Jap bombers first roared over our Pacific island bases, civilian workers at Guam, Wake, and Cavite fought side by side with men in uniform. Some were able to find guns; others used the weapons they had—wrenches, chisels, hammers. But such makeshift combat stands little chance against trained, equipped troops. With every base a potential combat zone and each newly taken territory a construction site, the job called for trained military personnel operating under military command rather than civilian contractors.

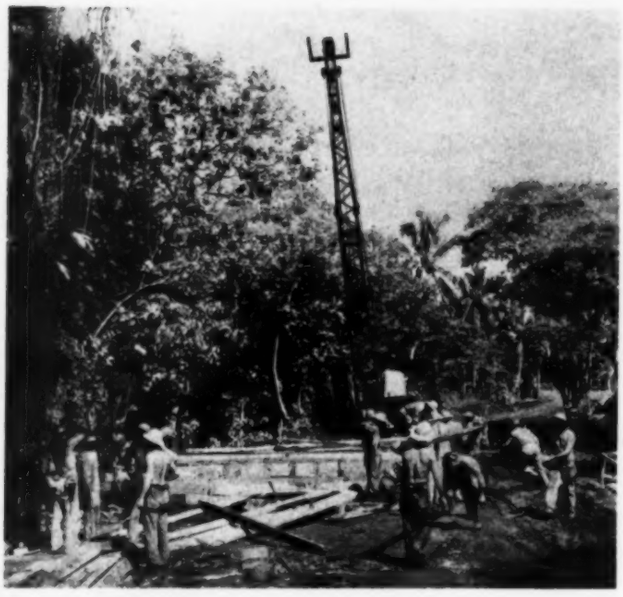
Hundreds of thousands of men of all skills are now in training for this specialized Seabee service to form compact groups that can perform all jobs on construction projects and also defend their work against attack. The construction companies are or-

STEEL WIRE MESH gives stability to roadbed across sand beaches.

QUONSET HUT (below) of corrugated metal sheets, assembled in heart of jungle, gets finishing touches from paint spray gun.







PILE BENT TIMBER BRIDGE (left and above) spans stream in newly completed jungle road. Crawler crane is used to place bridge timbers and is also fitted with leads to serve as piledriver rig.

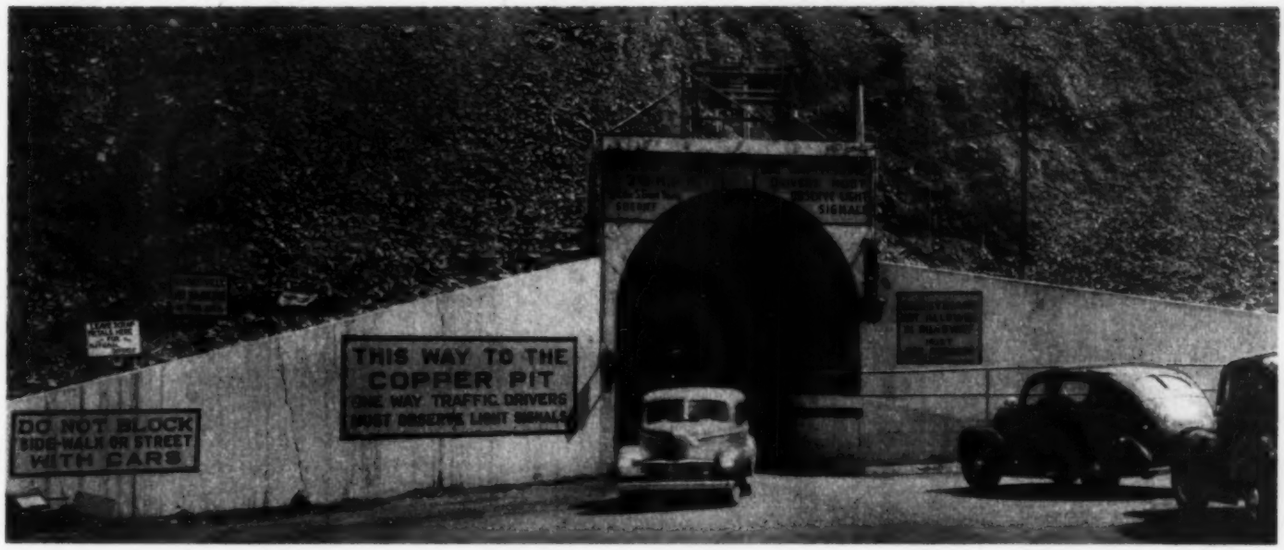
ganized along military lines into regiments of three battalions, each battalion comprising four construction companies of 226 men each and one headquarters company. Men are given 8 weeks of training and indoctrination before being assigned to advance bases.

Having mastered the elements of military procedure and defensive operations, many of these fighting construction men are now serving in far-flung fields, building, strengthening, and maintaining defenses of the United States. And should the need arise, these same men who know how to clear the jungle, build roads and bridges, erect houses, construct wharves and grade airfields, can also intercept any enemy attempt to interfere by bombs and guns with these facilities that keep our planes, ships and submarines in operation.

What the Seabees are actually doing under conditions of real warfare is indicated for the first time in the accompanying official U. S. Navy photographs, just released for publication. The scope of operations at an unidentified island base covers construction of wharves and docks, ramps, airplane landing fields, roads across sandy beaches and through thick jungle growths, bridges, and Quonset huts. While some of these operations have, of necessity, to be carried out by primitive hand-labor methods, the Seabees are equipped with a quota of heavy-duty construction equipment, including crawler cranes, tractor-bulldozers, piledrivers and other machines which are commonly employed on peace-time construction projects.

FOR WHARF FOUNDATION (below) multiple units are lowered into place by crane. All-purpose steel pontoons of this type also are assembled in groups to form landing barges and are used, as well, for storage of gasoline, oil and other fluids.

INGENUITY IS ESSENCE (below) of successful construction in primitive jungle. Here piledriver is improvised by rigging heavy weight on crawler crane in bridge-building operation. Native tree trunks serve as piles.



LOWER PORTAL of Salt Lake County Tunnel at Bingham, Utah, with car coming out and others stopped by traffic control signal at right. This has one green light and three red lights. Two of red lights are in multiple to provide for one light burning out, while other red light is connected through a throw-over relay to battery to stop traffic in case of power failure. Signal on left has one red and one green light, set low as some drivers have trouble seeing higher lights on right when close to tunnel entrance.

Electric Eye Controls Vehicular Traffic Through Single-Lane Tunnel

AFTER EXPANSION of the great Utah Copper Co. open-cut mine made it desirable for Salt Lake County, Utah, to abandon the county highway which ran across the ore body, it was decided to construct at Bingham a vehicular tunnel, approximately 6,000 ft. long through a mountain to replace the discontinued route across the ore body.

It was first thought that it would be necessary to make this tunnel wide enough for two-lane traffic, which would have been a very expensive project. Contractors' estimates indicated that an appreciable sum could be saved by constructing a single-lane, instead of a two-lane tunnel and installing equipment for automatically controlling the movement of traffic through the bore in both directions.

Salt Lake County officials decided to approve the single-lane tunnel after the General Electric Co. had agreed to furnish automatic traffic control for it.

The automatic traffic control had to meet the following cycle:

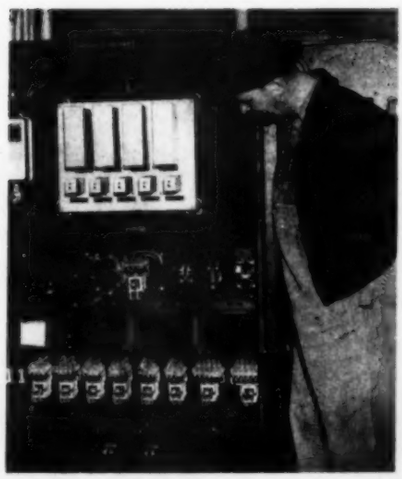
(1) Prohibit all vehicles from entering the tunnel until it is clear of traffic.

(2) Allow traffic to enter only at one end for 3 min.

(3) Prohibit all vehicles from entering either end of tunnel until it is clear of vehicles.

(4) Allow traffic to enter only at the

(Continued on page 122)



MAIN CONTROL UNIT in room just inside lower portal of tunnel is shown with Mr. Carlquist, Salt Lake electrician, in charge.

INTERIOR OF TUNNEL is equipped with housing for General Electric photoelectric relays which give impulses for counting cars. Two light beams shine across tunnel and into two holes in housing. When car interrupts both light beams it is counted.

Present and Accounted For · · · A PAGE OF PERSONALITIES

CONSTRUCTION OF U. S. NAVAL AMMUNITION DEPOT in Indiana brought Army-Navy "E" award to Maxon Construction Co., of Dayton, Ohio. With G. W. MAXON **(at left)**, president of company, are left to right: REAR ADM. JOHN DOWNES, COL. MARTIN H. RAY, CAPT. E. G. OBERLIN, and REAR ADM. H. G. TAYLOR.

SOUTHERN CALIFORNIA CHAPTER of Associated General Contractors of America is headed by LYMAN D. WILBUR, Los Angeles district engineer for Morrison-Knudsen Co., Inc. Included in Mr. Wilbur's varied experience since graduation from Stanford University in 1921 are many western irrigation and reclamation projects in addition to two years' studying and reporting on irrigation projects in Turkestan and Transcaucasia for Soviet government.

CHOSEN TO HEAD Osborn Engineering Co., of Cleveland, is C. G. ATKIN, former vice president in charge of engineering for H. K. Ferguson Co. Osborn company has designed many industrial plants and specializes in stadiums and athletic buildings. Mr. Atkin has recently been in charge of two of War Department's largest defense projects.

TO INCREASE PRODUCTION of diesel engines, C. L. CUMMINS, president, Cummins Engine Co., of Columbus, Ind., has been appointed executive consultant to War Production Board in Washington, D. C. His job is to review Army and Navy diesel requirements and allocate orders to fit plant capacities.

ASSOCIATION OF HIGHWAY OFFICIALS of North Atlantic States has elected as president HERMAN A. MACDONALD, commissioner of public works for State of Massachusetts. Mr. MacDonald is also vice president and member of executive committee of American Association of State Highway Officials.

ASSISTANT COMMISSIONER AND CHIEF ENGINEER of Minnesota Highway Department is ORIN L. KIPP **(below)**, member of department since 1914. He served first as engineer for state in Redwood County and was transferred to central office in 1916 in charge of federal-aid construction. In 1921, when trunk highway system was established, he was appointed construction engineer and in 1939 became assistant chief engineer and planning engineer.

NEW PRESIDENT of Albert Kahn Associated Architects and Engineers, Inc., of Detroit, Mich., is LOUIS KAHN **(below)**, formerly secretary-treasurer, who fills vacancy created by recent death of his brother, Albert Kahn. Louis Kahn, registered architect, has served since 1909 with organization that has been outstanding as designer of peacetime industrial plants of all types, in addition to many of country's largest war plants, including Ford Bomber Plant, Chrysler Tank Arsenal, Wright Aeronautical and Curtiss-Wright aircraft plants and the Pratt & Whitney airplane engine plant.

In the conversion from peacetime construction programs thousands of experts, carefully selected from our nation-wide group of construction specialists, are now all over the world directing the work of America's construction battalions.

These picked men are building airports, roads, depots—springboards to victory.

Tremendous tasks are being done at military speed because they are working with familiar tools—*picked equipment*—Blaw-Knox Finishing Machines, Concrete Spreaders, Road Forms, Bulk Cement Plants, Batcherplants, Clamshell Buckets, Tamping Rollers, Standard Steel Buildings—equipment which is built to work around the clock and to come through in a pinch.

When victory is won, these men will return home to resume their places in the big post-war construction program.

In the meantime, let's wish them luck. They can be sure that Blaw-Knox will continue to extend all possible help and support.

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CONSTRUCTION EQUIPMENT NEWS

LIGHTWEIGHT DECKING MATERIAL, known as "Dektred" may be used on metal, wood, concrete and many other types of surface and is especially adapted for use on war and cargo ships. Said to be easily applied and to wear well, to be unimpaired by cold temperatures and to soften but slightly in high temperatures, returning to normal when temperature is lowered. Claimed to be re-

sistant to action of oils, greases, gasoline, salt, sulphur and cleansing detergents, such as soap. Produced as thick liquid which may be sprayed on or applied with steel trowel. Self-leveling, repairs may be made with no appearance of patching, makers claim. Single spray or trowel of "Dektred" in medium gage or about 1/32 in. said to weigh less than 1½ oz. per sq. ft., when dry. In addition to providing non-slip floor covering, Dektred also affords protection from corrosion for metals and from machine for wood. Dries sufficiently to permit light traffic in from 2½ to 3 hr. For heavy traffic, about 8 hr. drying time is needed. On ships, Dektred is suitable for floors of officers' and crews' quarters, for passageways, stair treads, washrooms, showers and similar areas. — **Goodyear Tire & Rubber Co., Akron, Ohio.**

★ ★ ★

PORTABLE GASOLINE-DRIVEN GENERATOR for rapid battery charging is said to eliminate many problems connected with use of storage batteries in operations where electric current and conventional equipment for charging are not conveniently available. Designed to charge 6-, 12-, and 24-v. batteries at 10 to 300 amp. and consists of specially constructed genera-

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Coast Metals hard-facing is equally applicable to new parts or old ones, of any ferrous metal, including manganese steel, cast iron and chilled iron. Easy to apply, —by the electric welding arc or oxy-acetylene torch. Let our engineers show how you can use Coast Metal hard-facing to keep your equipment on the job without frequent time out for repairs or replacements!

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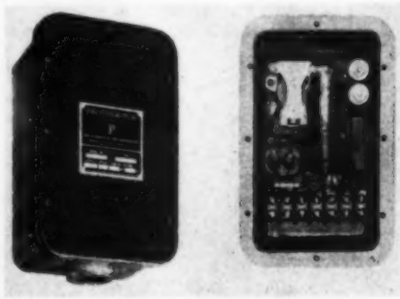
tor driven by 6-hp. single cylinder, air-cooled, gasoline engine equipped with air cleanser, gasoline filter, magneto, self-starter, rope starter, gas tank and remote stop control. For easy portability, entire unit is mounted on skid-type base equipped with 5-in. wheels. Unit may also be used, according to manufacturer, as direct current lighting plant with output range of from 1,000 to 3,000 watts, as required. — **Hunter-Hartman Corp., 2865 Washington St., St. Louis, Mo.**

★ ★ ★

ELECTRONIC LEVEL CONTROLS, designed particularly for hazardous location mounting, is now available for use with conductive liquids of an explosive nature. High and low level control models are offered, each supplied as complete unit in vapor-proof, cast-



iron housing for direct tank installation. High level control is exercised when liquid rises and contacts probe tip; low level control, when liquid drops below probe tip. Both models have safety feature providing for operation of relay in case of current or tube failure. Type P15NHX controls level of any conductive liquid, such as water or acids, in tanks of gasoline, oil or similar non-conductive materials. — **Photoswitch Incorporated, 21 Chestnut St., Cambridge, Mass.**

★ ★ ★

PLASTIC HOUSING for ¼- and ⅜-in. drills is made of new material called "Drillite," consisting of shredded cotton duck base, said to provide high impact resistance and to enable tools to withstand considerable abuse and wear. Plastic also is heat resistant and claimed to be perfect insulator against dielectric shock. Housing is smooth and easy to handle and its lustrous black finish maintains appearance of tool for long period. For long productive life, steel inserts have been cast into plastic housing to carry all ball-bearings

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There's no time to waste with the steel mills roaring for more scrap. Koehring Cranes handle all types of metal scrap with the grapple or magnet. If the strong, powerful magnet does not attract the metal, the massive jaws of the grapple will swiftly swallow it up. The ease and speed with which Koehring operates is accountable to its independent boom control. Raising or lowering the boom and hoisting the scrap are operations independent of swinging or traveling. Koehring Cranes are highly efficient to metal handling in any size yard.

KOEHRING COMPANY • ***Milwaukee, Wisconsin***

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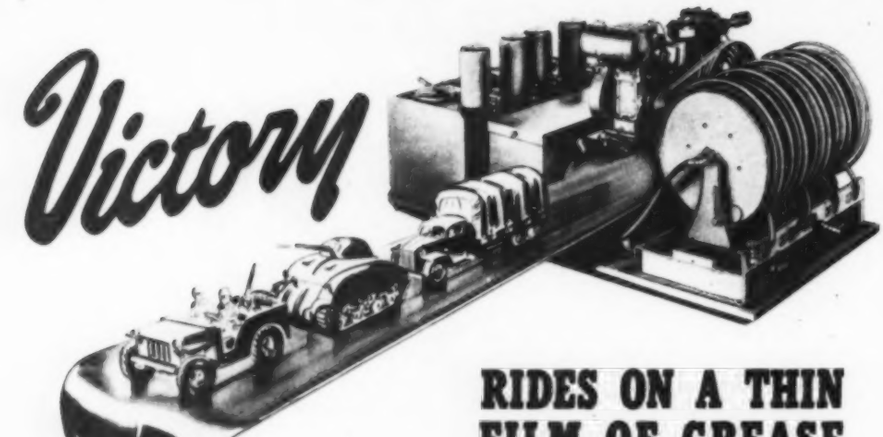
HEAVY-DUTY CONSTRUCTION EQUIPMENT



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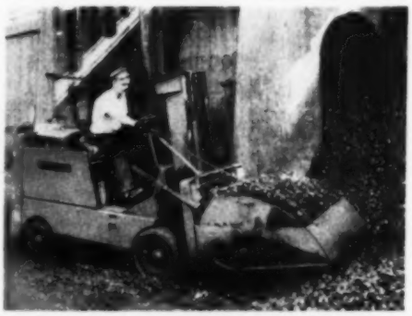
and threaded steel inserts in field housing for housing assembly crews. Steel air vents in commutator end housing insure ample motor ventilation. Outstanding feature: reduction in weight of complete unit, resulting in higher ratio of power per pound. Both units offered with end- or side-handle control, equipped with pistol grip and trigger switch and with Universal motors, operating either on ac. or dc. current. — **Black and Decker Mfg. Co., Towson, Md.**

★ ★ ★

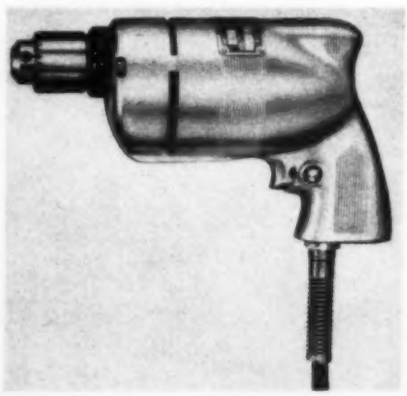
SHOVEL-TYPE SCOOP in capacities from 8 to 25 cu.ft. which may be interchanged with standard forks for greater efficiency in picking up, carrying and dumping loose bulk materials, such as ore, glass and metal scrap, has been developed to increase versatility of Towmotor lift trucks. Manually controlled,



scoops can pick up or dump materials at any point within lift range. Resetting to digging or carrying position after dumping is accomplished by lowering to floor level until spring-operated catches automatically take hold. Optional feature is anti-spilling device which fits over front lip of scoop and permits transporting of full loads of loose material at moderate speed over rough surfaces. Anti-spiller is easily pulled out of way for loading and remains in fixed position during dumping so that loads can spill out freely beneath it. — **Towmotor Corp., 1226 E. 152nd St., Cleveland, Ohio.**

★ ★ ★

¼-IN. HEAVY-DUTY DRILL, known as Model 47, "Skildrill," although specially designed to speed up tough "skin-drilling" in airplane construction, is also recommended for numerous production drilling jobs up to ¼ in. in steel and ½ in. in wood. Small, light and compact, it is said to have great power for



tough jobs and unusual drilling speed under load. Weight, 3½ lb; length, 7¼ in.; width 2 9/16 in. Die-cast body, helical-cut gears and 100 percent anti-friction bearings for smoother, quieter running. Universal motor available in 4 speeds: 1,800, 2,500, 3,500 and 5,000 rpm. Two-pole momentary contact switch with lock for continuous operation. — **Skilsaw, Inc., 5033-43 Elston Ave., Chicago, Ill.**

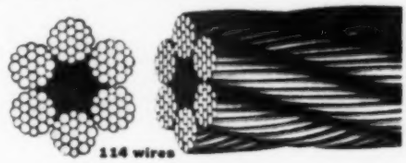
A Short Breaking-in Period Extends Wire Rope Life

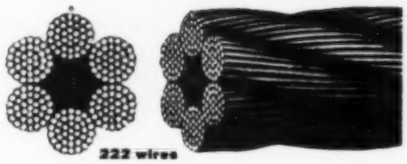
(This is Number 14 of a series of informative articles on how to get the most out of wire rope. It is directed to those who want to do everything they can to lengthen wire rope life and conserve steel. Other articles in the series are available on request.)

* * *

Cooperation in the present emergency is a vital necessity to success. It is a basic fundamental without which wars cannot be won, freedom cannot be maintained.

Cooperation within a piece of wire rope is just as essential to its success, but, being wire rope, it needs our help to do its job.





There are 114 or more wires in the average wire rope. They need to cooperate together by each carrying their share of the load. Illustrated above are two standard ropes showing number of wires in each.

The process of manufacture lays these wires into a rope and manufacturers ship this rope to you prepared to do its task.

The rope's success depends a great deal on how it becomes adapted to the equipment and to the work it must do.

WHAT "BREAKING IN" MEANS

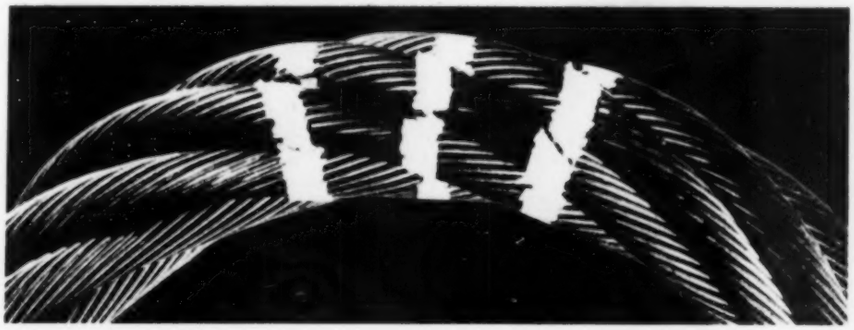
For example, we all know that the life of a book depends upon proper handling at the start. To simply grab a book and pop it open injures the binding, but by gradually and carefully opening the book at different points, it becomes "broken in" and its life is greatly extended.

Wire rope is a complex machine that has many wires, like a book has many pages. When the rope is put into use, a little care in handling and operating it at first, pays dividends later. Haste makes waste, which you want to avoid.

The breaking-in period gives the rope a chance to adapt itself to the track or path in which it must travel. It becomes accustomed to the arc of bending, becomes comfortably seated in the groove and assures the operator, after a short "trial run," that it is ready to go to work safely.

"BUT WE CAN'T TAKE THE TIME TODAY!"

The actual time taken to properly break in a rope is a small percentage of the time it takes to install a rope. If you must replace rope often and you can cut down the number of replacements by extending rope life, you will be conserving steel, reducing costs, and actually saving time.



BENDING DOES THIS

To get the picture (above) three white stripes were painted around a $\frac{5}{8}$" 6x37 PREformed wire rope before bending. Then the wire rope was flexed by hand and this picture taken. Notice how the paint cracked up and separated, caused by the movement of the wires and strands to make the bend. Getting the rope accustomed to this flexing and wire and strand movement is a job of breaking in.

"WHAT SHALL WE DO?"

First, as has been explained in previous articles of this series, the equipment should be in good repair.

Second, as explained in article 9 of this series, the rope should be unwound from the reel or coil so as to avoid twisting and kinking.

Third, the rope should be firmly attached to the equipment, taking care to seize it with wire to prevent it untwisting.

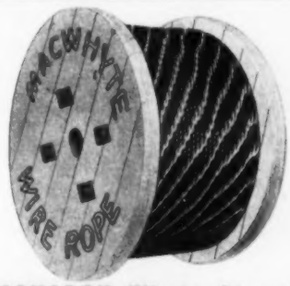
Fourth, after rope is attached and reeved around sheaves and drums, operate it without load a few times, until you see that it is flexing easily over sheaves and winding correctly on the drum.

Fifth, gradually increase the speed and load until the rope is operating up to its normal loading and speed.

WHAT ABOUT PRE-FORMED ROPE?

During the manufacture of the rope, the process of PREforming adjusts the wires and strands into the helical shape they take in the rope. This is often called a "breaking-in" process that helps prepare the rope for quick use and therefore it should not require as much "breaking in" on the job.

However, whether PREformed or non-preformed, it pays to handle the rope carefully and give it a chance to get accustomed to the operation of the equipment.



MONARCH Whyte Strand PRE-FORMED WIRE ROPE

. . . Macwhyte premier wire rope, famous for its strength, toughness, and internal lubrication.

NO. 666

MACWHYTE COMPANY

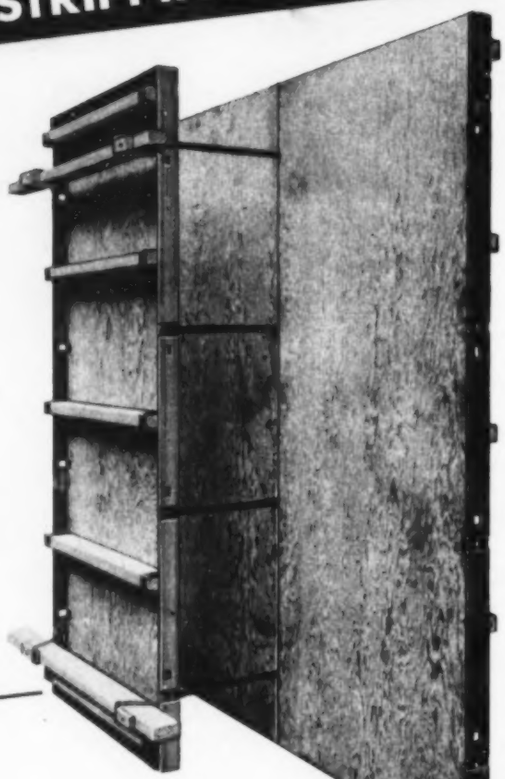
WIRE ROPE

2941 FOURTEENTH AVENUE KENOSHA, WISCONSIN

Manufacturers of MACWHYTE PREformed and Internally Lubricated Wire Rope MONARCH WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Cable MACWHYTE Braided Wire Rope Slings MACWHYTE Aircraft Cables and Tie-Rods

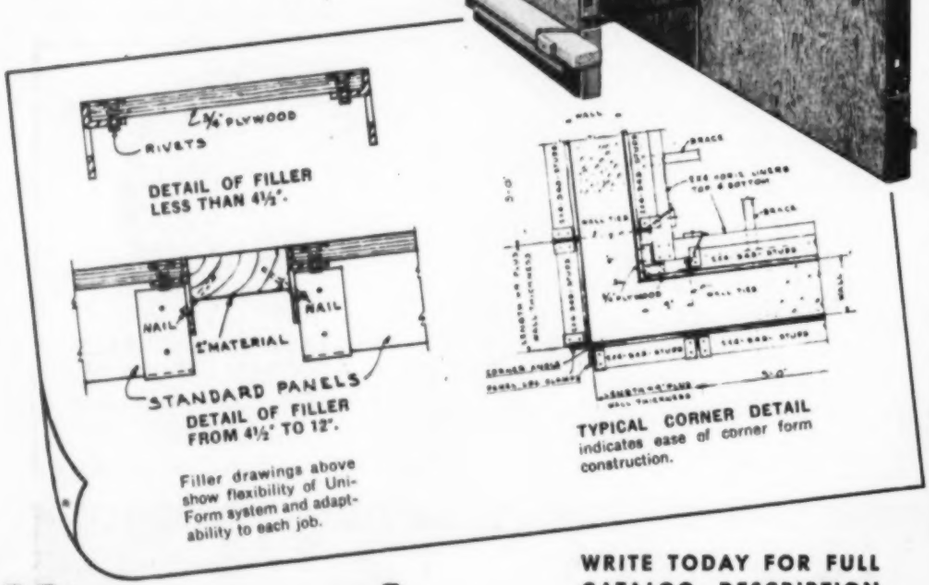
UNI-FORM FOUNDATION UNITS

SAVE 25% ON FORM ERECTION AND STRIPPING



Combined with low unit cost of forms—and re-use economies—this means real savings in foundations for housing

For multiple housing units—both now and in the post-war period—Uni-Form Foundation Units offer both money and time-saving advantages. Particularly important values to be found in these Universal units are: (1) Side members are fabricated so they can be used as fillers meeting *each* job condition; (2) Available in story-height, all-size panels; (3) Forms have no top and bottom, right or left—no worry about setting forms in proper position before erecting; (4) No walers are required; (5) One man can handle these light weight forms. The detail drawings below indicate how simple Uni-Form Foundation Units are to use.



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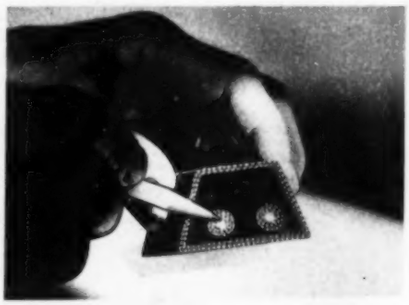
BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

VOLTAGE TESTER automatically indicates: whether voltage is 110, 220, 440 or 660 v.; if current is ac. or dc.; if appliance, motor or whatever is connected in line is open; which leg is grounded; if frequency is 25 or 60 cycles; if fuse is blown; when one side of

appliance or motor connected to line under test is grounded; excessive leakage between motor and line; when three-phase motor is running erratically due to blown fuse. To use: connect needle pointed test prods across any electric line. Four individual GE type NE-7 neon bulbs used in conjunction with network of resistors provide most services necessary for industrial electrical maintenance. Multi-colored etched steel panel designed for easy reading, and unit is completely housed in rugged, hand-rubbed, wooden box. Said to draw less than 1 milliampere of current. Size, 1¾x5x1⅜ in. Weight, 5 oz.—**Superior Instruments Co., Dept. T, 227 Fulton St., New York City.**

★ ★ ★

WIRE-REINFORCED V-BELTS are now available for use on machines on which they are deemed practical after thorough engineering investigation of use and operating conditions.

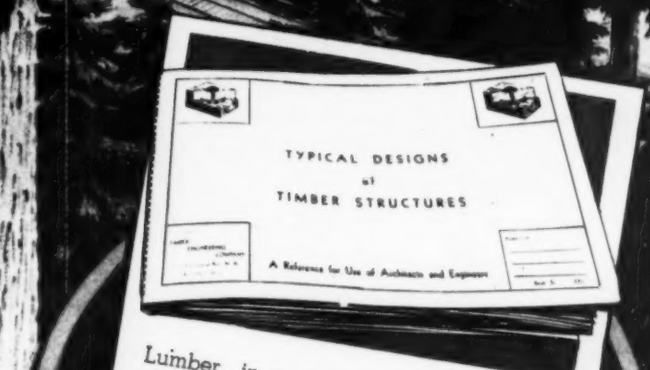


Two types are being built, cable cord construction and grommet construction which incorporates wire cord placed in center of cotton or rayon grommet. Advantages of this type of belt are greater horsepower capacity, increased tensile strength and low stretch. —**The B. F. Goodrich Co., Akron, Ohio.**

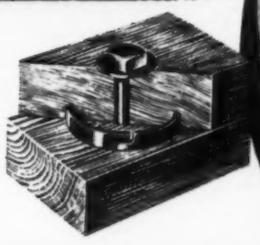
FREEDOM IS NOT FREE~IT IS PRICELESS ~ *BUY WAR BONDS*

SELECTED FOR SERVICE

Topping the "spar tree" preparatory to forestry operations. Selective harvesting of fully matured trees in the surrounding forest will assure continued forest growth.



Lumber, in a thousand different forms, streams to the fighting fronts of the world. At home, wood replaces metal in thousands of heavy duty war structures—made possible by the TECO Connector System of Timber Engineering. This FREE Reference Book shows details of 45 typical timber designs for roof trusses, bridges, towers, tanks, hangars, and other structures for the war today and the peace tomorrow. Available to practicing engineers and architects. *Write* for it today—using your firm letterhead.



The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play

TIMBER ENGINEERING COMPANY

NATIONAL MANUFACTURERS OF ***TECO*** *TIMBER CONNECTORS AND TOOLS*

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WOOD GOES TO WAR — An MGM Technicolor short by James A. Fitzpatrick. Ask your theater when you can see it.

QUALITY

Unless your jacks do their job in every emergency — your investment is wasted. That's why you need those "extras" combined only in Blackhawk Jacks — the superior design, clean precision production and better materials that build essential QUALITY. Let your Blackhawk Jobber Salesman help you secure the right models according to loads, tire sizes and axle heights.

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"Multiply AMERICA'S MAN-POWER!"

PLASTIC EYESHIELD designed to deflect hazardous flying particles is practical easy-to-use device available for service at all times. Said to afford full vision and comfort. So hinged that it is readily positioned before eyes in

proper facial curvature by downward flip and when not in use, lies flat against brim. Eyeshield remains firmly in place in either position. May be ordered with all kinds of M.S.A. Skullgards and Comfo caps or separately for attachment to hats and caps all ready in service.—**Mine Safety Appliances Co., Braddock, Thomas and Meade Streets, Pittsburgh, Pa.**

★ ★ ★

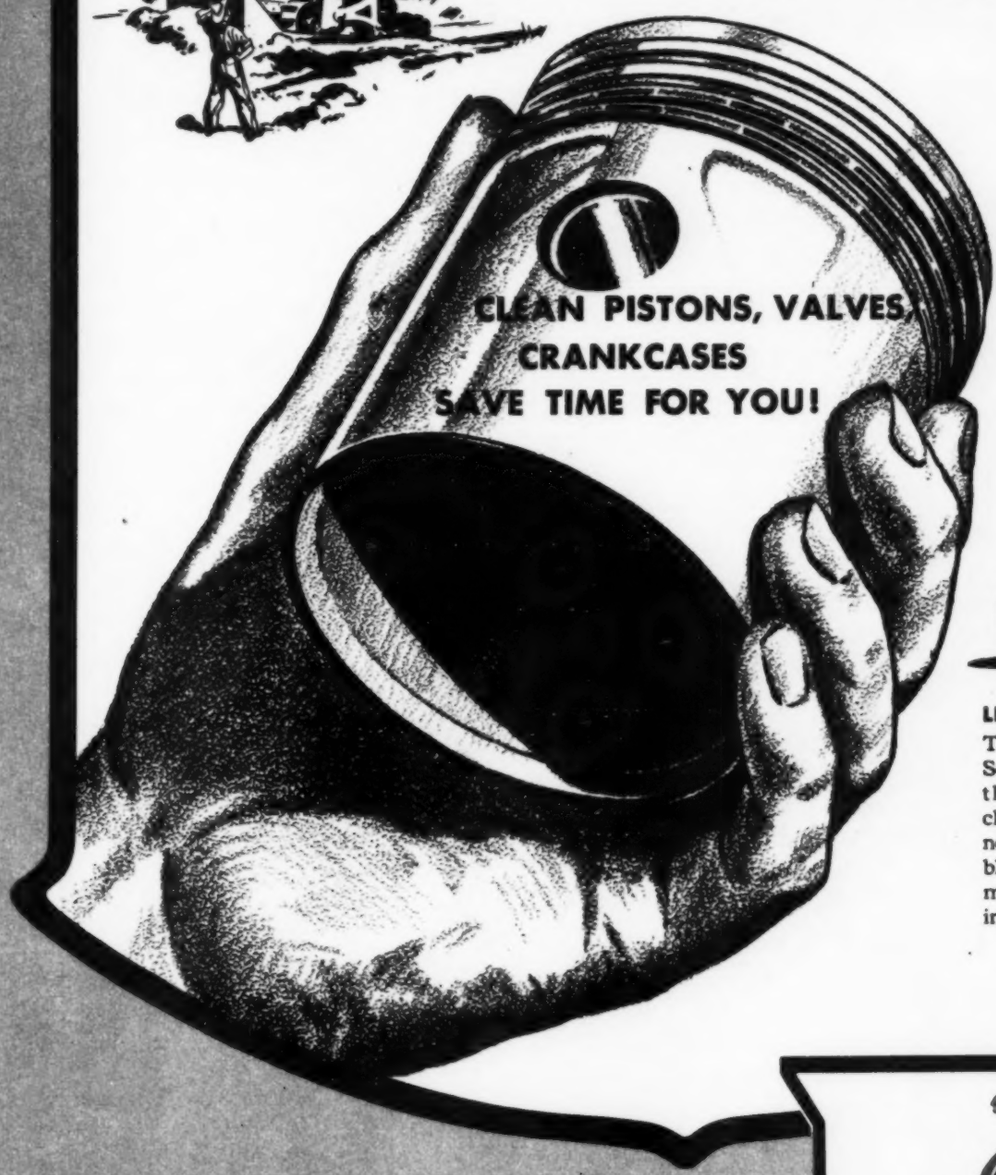
200-WATT INCANDESCENT FLOODLIGHT with silver mirrored glass "Permaflector," for fixed locations and for mounting on power shovels, bulldozers, trucks and cranes, is shock-resistant and weatherproofed. Housed in corrosion-resistant sheet steel housing with

convex, heat-resisting 8⅜-in. cover glass, equipped with removable lens frame and clamp, porcelain socket and weatherproof, cord-grip fitting. Height, 12½ in. overall; weight, 6½ lb. Adjustable bracket, permitting 250 deg. vertical and 360 deg. horizontal swing.—**Pittsburgh Reflector Co., Oliver Bldg., Pittsburgh, Pa.**

★ ★ ★

CASEIN-BOUND "PAPER ADHESIVE" eliminates slippage of joints in making of large scale blueprints and also provides glue bond which will withstand various baths to which jointed blueprint paper is subjected while paper is traveling through machine. When used in

IT'S NO TIME FOR ENGINE TROUBLE! With war-rushed schedules the rule, breakdowns and delays on the job must be kept at a minimum. Read below how a remarkable new series of Socony-Vacuum oils can help you do this.



LESS "DOWN TIME"... The new Delvac "900 Series" oils help reduce the number of engine cleanings and overhauls needed . . . enable valuable equipment to spend more time working, less in the shop! Read below.

A NEW GROUP OF SOCONY-VACUUM OILS

DELVAC "900 SERIES" keeps vital equipment on the job!

These new oils — recommended for *all* high-speed Diesel engines and gasoline engines in heavy service—contain detergents which give them remarkable properties.

They resist to an extreme degree the formation of "varnish," "lacquer," gum and sludge. They hold the products of combustion in suspension, so they do not settle out and form deposits. They assure maximum protection, as they are non-corrosive to hard-alloy bearings!

In short, you get far cleaner, safer engines than is possible with older-type oils!

SOCONY-VACUUM OIL CO., INC. and Affiliates: Magnolia Petroleum Co., General Petroleum Corporation of Calif.

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SOCONY-VACUUM FUELS, LUBRICANTS AND ENGINEERING SERVICE

Get In and Out Profitably
H & B stationary and gravity type portable plants are also available in batch capacities of 300 to 8,000 lbs.

THE *"Brass Brain"* (FLUIDOMETER)

This automatic metering system saves time, materials — insures uniformity. For all types of plants.

ON THE SMALL TONNAGE, "HARD-TO-REACH" ASPHALT JOBS...

● This Model MH Hetherington & Berner portable asphalt plant is a *full-size* wheel mounted plant with all units on the ground—no erection required. The dryer is built on a substantial steel frame, equipped with tandem axle and fifth wheel, permitting the unit to be moved with any standard truck-tractor. The mixer unit, arranged as a semi-trailer, utilizes same axle as the dryer unit. The anti-friction bearings and 2,500 lb. steam jacketed mixer make this the equivalent of stationary plants in sturdiness and capacity. With this plant you can get in and out profitably on the small-tonnage, hard-to-reach jobs, with a minimum investment in running gear. Write for Bulletin CM-260.

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Over that Horizon comes *Freedom*

PAUSE, Norseman, and look to the western horizon. For twenty centuries the Vikings roved beyond it. Today, hundreds of your brothers have escaped across this horizon, and will return with their allies to win back your Nazi-cursed soil.

You toil by day beneath the lash of your oppressors. But, by night, you strike back again and again — for your love of freedom is unconquerable.

As you do your part, so do we. The mine and quarry men of America are applying their effort and skill toward freedom for the world. The millions of tons of rock and coal and ore that they blast loose are the very genesis of war machines and munitions. To speed their work and safeguard their lives, the Ensign-Bickford Company is producing Safety Fuse, Primacord-Bickford Detonating Fuse, and other supplies essential to Victory — for *Victory Begins Underground!*

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SIMSBURY, CONNECTICUT

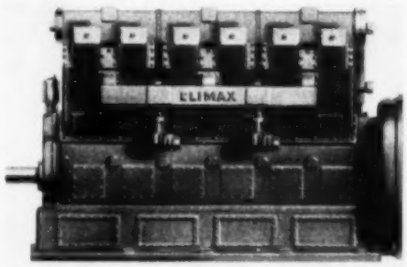
E-P

Primacord-Bickford *Detonating Fuse*

blueprinting machine, paper being joined is usually lapped about 1½ in., and glue spread on with brush of same width. Joint is made as paper is moving into machine by applying second paper on top of glued surface and rubbing hand over top of lap to create contact. Glue bond will be made by time joint has traveled over heated roll in machine and joint then is ready to receive various water baths necessary in this work.—**I. F. Laucks, Inc., 911 Western, Seattle, Wash.**

★ ★ ★

ALL-PURPOSE, 435-HP. HIGH-SPEED GASOLINE ENGINE for use in operating with local fuel, oil drills, large pumps and compressors, for driving mining and construction machinery. Has normal speed range of 600 to 1,200 rpm. and brake horsepower of 435. This new V-12 engine is available in two models; V-335 — 6½x7-in. bore and stroke developing

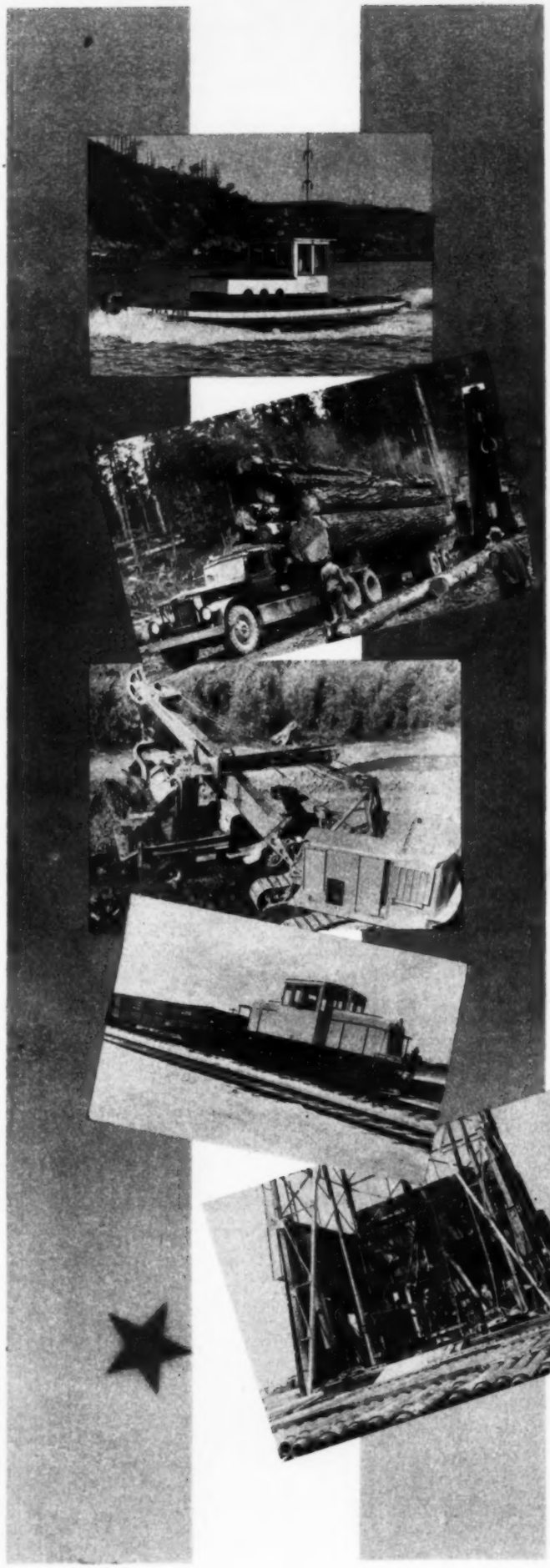


375 hp. at 1,200 rpm.; V-390 — 7x7-in. bore and stroke develops 435 hp. at 1,200 rpm. Design and operating characteristics: (1) Wide fuel range — functions on natural gas, butane, gasoline and other fuels; (2) economical dual carburetion — provides complete and uniform fuel distribution; (3) dependable dual ignition — each cylinder has two spark plugs which provide greater flame, increase power output and remove possibility of ignition failure; (4) specially shaped combustion chamber assures maximum turbulence for perfect combustion; (5) high capacity cooling system; (6) infrequent and low-cost maintenance. Complete range of accessory equipment such as starting device, air cleaners, filters, and radiators, if desired. — **Climax Engineering Co., Clinton, Iowa.**

★ ★ ★

FOR SHIFT ROTATION on equitable basis, shiftograph is hand instrument of revolving dial type which provides perpetual work shift schedule for 157-hr. and 161-hr. weeks on several different plans, each of which assures uniform treatment for all employees, who

share equally in desirable and undesirable shifts. By turning dial, user can tell what shifts certain crews will work, days they will work and days they will be off. Shiftograph can be obtained free by writing on business letterhead to — **George S. May Co., Business Engineers, 2600 North Shore Drive, Chicago.**



At its best . . . when the going is

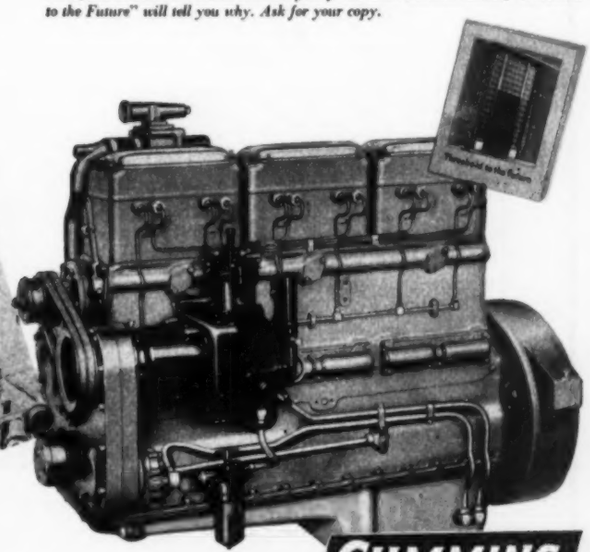
Tough

The first Cummins high-speed Diesel was offered to the public in 1932. From that day to this, the Cummins Diesel has never asked for the easy jobs . . . but has consistently proved itself in the face of the longest odds . . . on the toughest, the longest and the hardest pulls . . . on the jobs which demand the delivery of an engine's full rated horsepower day after day.

Now, after a decade of conditioning, the Cummins Diesel is ready for action—*is in action*—on every front in this global war. Its quick starting has been tested in the sub-zero arctic cold. Its cool running has been demonstrated in flaming desert heat. Its simple, easy service and maintenance has been proved in the world's most inaccessible, out-of-the-way places.

In short, the Cummins Diesel has proved its ability to uphold the highest American tradition . . . to do its best job when the going is toughest. CUMMINS ENGINE COMPANY, Columbus, Indiana.

Out of the experiences of owners during the past 10 years—plus new tests which the engine is meeting daily—a newer and better Cummins Diesel is now building . . . one which will do your job at a lower cost, for a longer time, with fewer parts replacements and service requirements. When all-over economy again becomes the yardstick of value, this new Cummins Diesel will be your first choice. The new booklet, "Threshold to the Future" will tell you why. Ask for your copy.

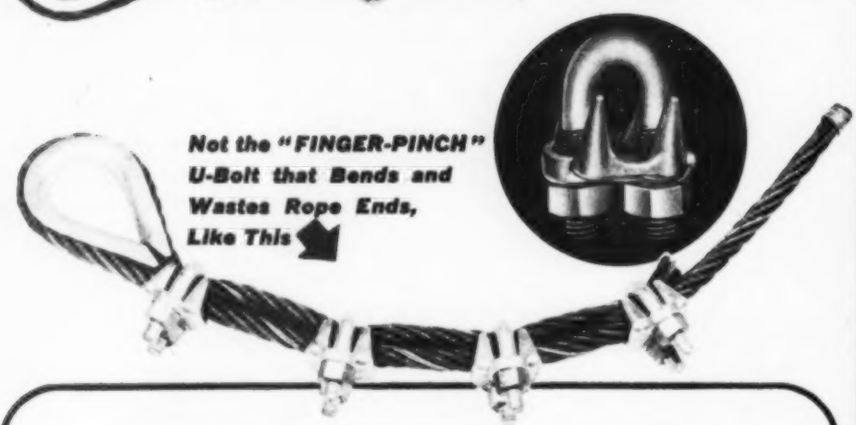


CUMMINS
Dependable
DIESELS

Here's Another Way to Make Wire Rope Last Longer

Use the "FIST-GRIP" Wire Rope Clip that Keeps Rope Straight and Strong, Like This

Not the "FINGER-PINCH" U-Bolt that Bends and Wastes Rope Ends, Like This



NOTE: The photographs of wire rope assemblies shown here are exact representations of two ¾-inch ropes fitted with recommended number of clips; all nuts on both wires uniformly tightened with indicating wrench. When "Fist-Grip" Clips are used, rope remains straight, whether or not load is applied.

Congratulations to you wire rope users cooperating with wire rope companies in Victory Rope-Saving Drive!

Laughlin "Fist-Grip" Safety Clips fit right in with your program. Don't risk wasting rope with bending, warping U-bolts.

Save war-essential metals, too. Safety Clip design, with uniform vise-like grip, delivers full rope strength with less clips. Impartial laboratory tests prove 3 do the work of 4 U-bolts.

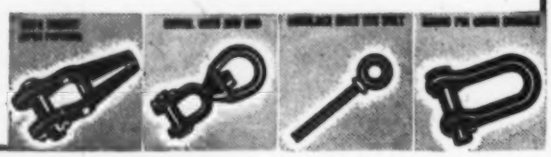
Finally, you save both time and man-power with Laughlin "Fist-Grip" Safety Clips. Identical halves—they can't be put on backwards, even by green men—fewer accidents! Nuts on opposite sides are faster to put on and take off. Design is stronger—and those drop-forged bolts are also plenty strong. Bolt ends don't protrude, don't become battered and useless.

Save rope—clips—time—money—man-power—starting now!

THE THOMAS LAUGHLIN Company
PORTLAND, MAINE

Laughlin "Fist-Grip" Safety Clips distributed through Mill Supply Houses.
Look for Laughlin Products in Thomas' Register

ARMY E NAVY



GOGGLE CLEANING STATION, designed to encourage workers to wear their goggles and to keep them clean, is compact case fitted with Fogprul, lens cleaning and anti-fogging agent, and wiping tissues, and equipped for

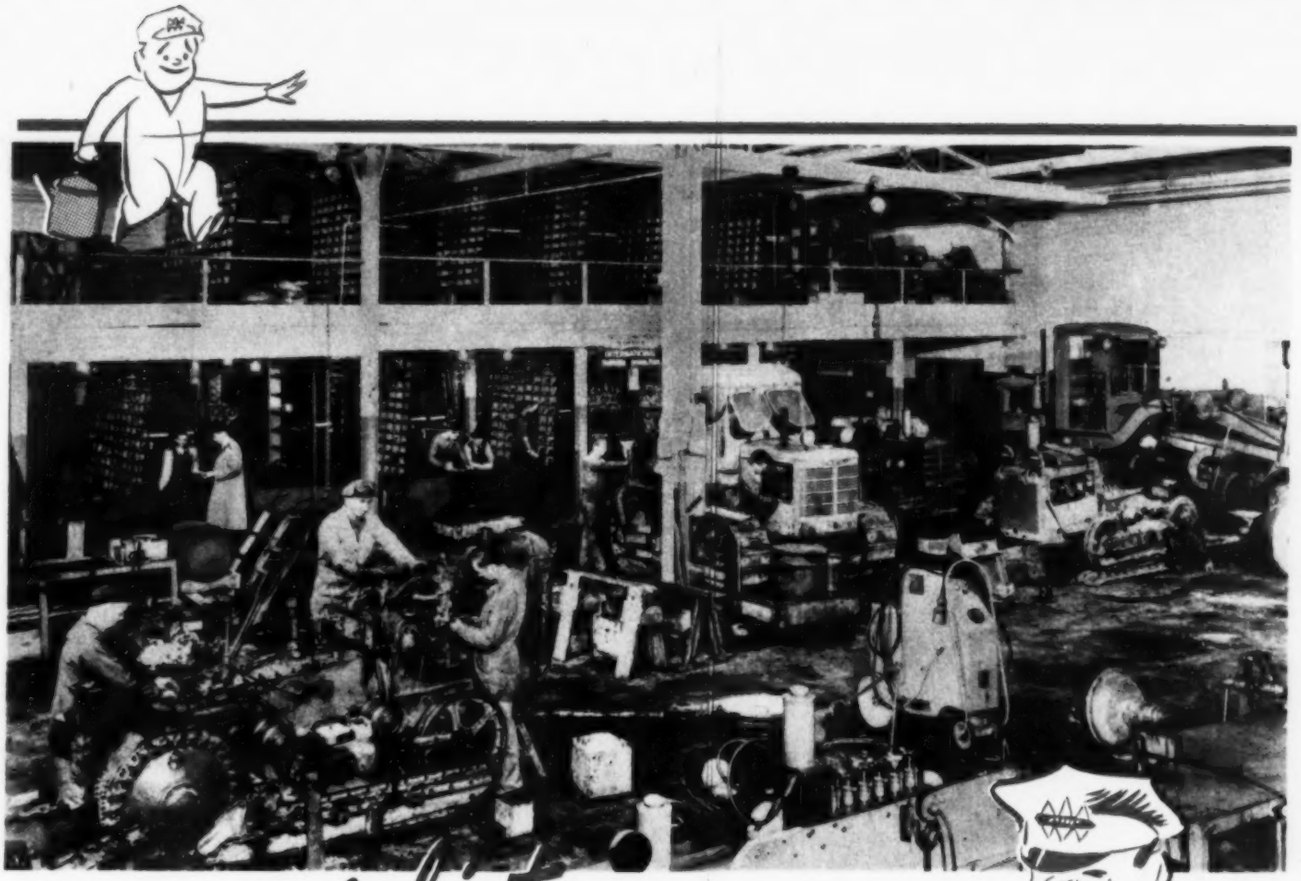
convenient mounting on walls of plant. To operate, tap on inverted vial sprays Fogprul on goggle or spectacle lens. Cleaning tissues are pulled from opening in top of station and may be discarded in receptacle in lower part of case.—**Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa.**

★ ★ ★

PHOTOCOPY MACHINE is said to make photo-exact copies of anything written, printed, drawn or photographed. Advantages: (1) Simplicity of operation; (2) no repair, or maintenance problems; (3) requires no proofreading or comparison; (4) rapid in operation enabling single employee to do work of several. Produces copies of various sizes up to 18x22 in.—**American Photocopy Equipment Co., 2849 N. Clark St., Chicago, Ill.**

★ ★ ★

SMALL-SIZE BULLDOZER, is built especially to swing into action at moment's notice after bombs have left craters on airports or on military roads over which armies and materiel must move unhampered. Claimed to be smooth in operation, fast in action and to level off broken surfaces promptly with minimum of cost and for small initial investment. Moldboard is ⅜ in. thick and 6 ft. long. Total width of blade is 20 in. Blade clearance in



Specialists in INTERNATIONAL SERVICE . . . on the Job for You!

MOST International Industrial Power dealers' service shops today are just as busy as the one shown above. Skilled servicemen who are *specialists* in motor and equipment overhaul are doing their wartime best.

We've always considered International Parts and Service important. Now, they are *absolutely essential* in keeping International Tractors and Engines on the job.

Wherever your work takes you—wherever you are located—International Service is always close at hand. International Industrial Power dealers are conveniently located in principal cities, close to centers of construction activity.

Backing up this network of dealers is our coast-to-coast International branch organization. Make International dealers and branches your partners in helping keep your equipment on the job. It will pay you in *longer equipment life* and *less time out for major overhaul and repair.*

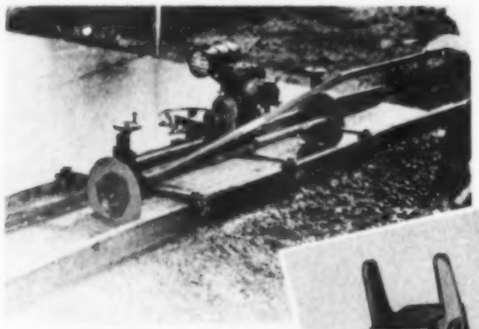
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue, Chicago, Illinois

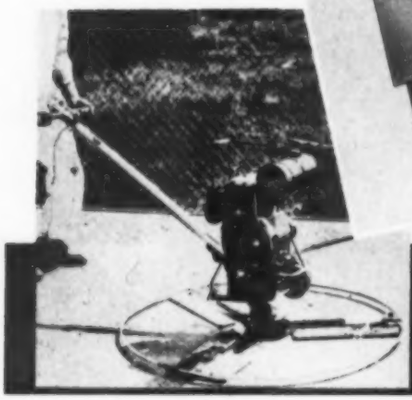
MAJOR WAR PRODUCTS BUILT BY INTERNATIONAL HARVESTER

Half-track Military Vehicles
Torpedoes Artillery Prime Movers
Automatic Airplane Cannon
Oerlikon Gun Mounts
Military Trucks
Military Tractors
Steel Products for Military Use
Shells Gun Carriages
Tank Transmissions
Adapter Boosters
Airplane Engine Cowling Assemblies
Trackers Gun Loaders
Marine Corps Invasion Ice Chests
Blood Bank Refrigerators

POWER FOR VICTORY
INTERNATIONAL HARVESTER

Whiteman Concrete Equipment will help solve YOUR labor problems

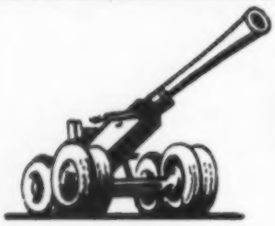




Use the WHITEMAN Rodding Machine for screeding your concrete slab work—one operator can handle 4 cu. yds. of low slump mix in 5 minutes. The dual-purpose WHITEMAN Finishing Machine, with its interchangeable blades, will speed your floating and finishing. One-man operated, this machine covers 1,000 sq. ft. in as little as 15 minutes. Two other WHITEMAN time-savers: the WHITEMAN Screed Stake Caps—easily adjusted, can be used time and again; and the WHITEMAN Hand Grill Tamper you will find indispensable on small jobs. All are available on properly rated orders.

For information see your nearest distributor or write direct to:

Whiteman
MANUFACTURING CO.
3249 Casitas Avenue Los Angeles, California



NO! WE DON'T MAKE CANNONS

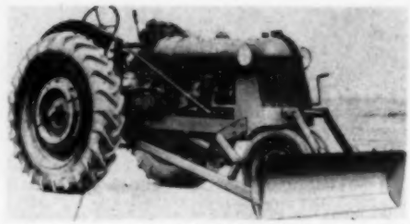
• BUT we do make CONCRETE VIBRATORS and PORTABLE POWER PLANTS to vibrate the concrete for BIG GUN mountings—AND that's not all—PROMPT DELIVERIES can be made on the RIGHT PRIORITIES.

There is a JACKSON VIBRATOR for every concrete placement job—SO—if you have concrete to vibrate see us—we'll (1) send literature, (2) quote prices and (3) quote deliveries if you wish.

High class distributors all over the country

ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON MICHIGAN

Jackson VIBRATORS



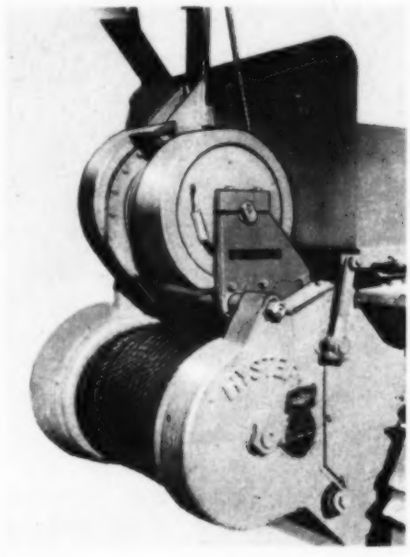
raised position is 22 in. Depth below ground, 6 in. Moldboard is hydraulically controlled from operator's station. Moldboard and blade are pivoted to push pole and returning arms to provide cleaning action to moldboard as it is raised. Approximate weight, 600 lb. — **The Huber Manufacturing Co., Marion, Ohio.**

★ ★ ★

EARTHMOVER AND EXCAVATING TIRE, known as Rayon Multi-Ply tire and said to possess new degree of durability and strength, and to provide 98 percent more resistance to body breaks than tires heretofore available for this field of operation was developed for three-fold purpose of increasing tire life, conserving rubber and speeding up earthmoving and excavating operations. Despite increased strength, tire maintains full degree of flexibility, a characteristic which is necessary to efficient operation. Because of resistance of this new construction to body failures, full potential of tread life is utilized. Tires of old type, because of body weakness and consequent early failure, were frequently consigned to salvage even though tread was in good condition. In addition to conserving rubber by reducing premature removal of tires, new construction also means fewer costly delays because of equipment laid up awaiting tire repairs. — **The Firestone Tire & Rubber Co., Akron, Ohio.**

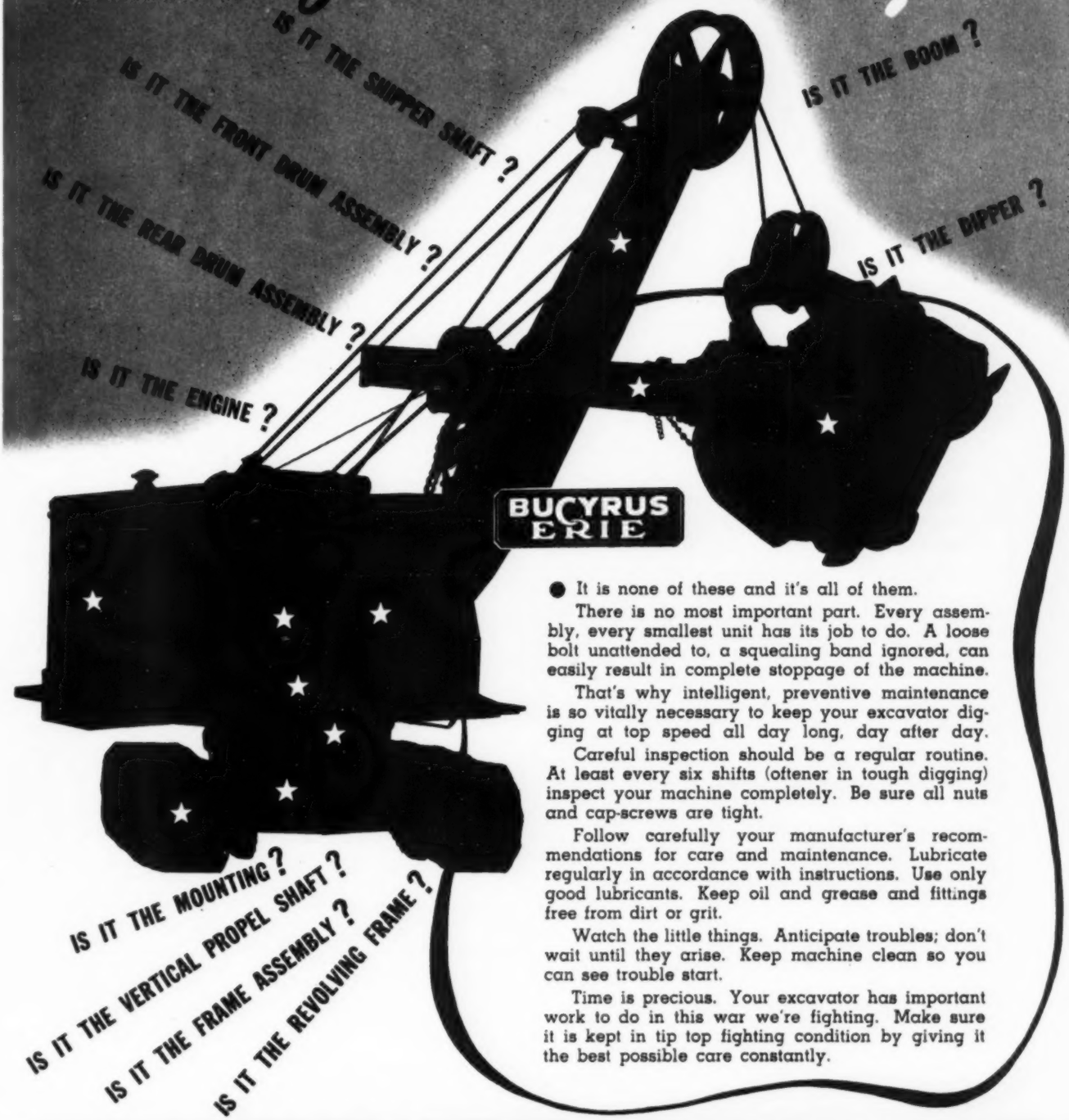
★ ★ ★

COMBINATION BULLDOZER AND TOWING WINCH mounted on Caterpillar D4 or R4 tractor has been developed for use of Combat Engineers by utilization of LeTourneau single-drum power control unit for dozer operation



together with Hyster D4 towing winch. LeTourneau drum has speed of 308 ft. per min. on bare drum; winch has line pull of 15,400 lb. and its line speed is 91 ft. per min. on bare drum. While built for military use, this power control unit will be of interest to loggers, contractors, utilities and other tractor users who need a dozer plus power winch. — **R. G. LeTourneau, Inc., Peoria, Ill.**

What is the Most Important Part of an Excavator?


IS IT THE SHIPPER SHAFT?
IS IT THE FRONT DRUM ASSEMBLY?
IS IT THE REAR DRUM ASSEMBLY?
IS IT THE ENGINE?
IS IT THE BOOM?
IS IT THE DIPPER?
BUCYRUS ERIE
IS IT THE MOUNTING?
IS IT THE VERTICAL PROPEL SHAFT?
IS IT THE FRAME ASSEMBLY?
IS IT THE REVOLVING FRAME?

● It is none of these and it's all of them.

There is no most important part. Every assembly, every smallest unit has its job to do. A loose bolt unattended to, a squealing band ignored, can easily result in complete stoppage of the machine.

That's why intelligent, preventive maintenance is so vitally necessary to keep your excavator digging at top speed all day long, day after day.

Careful inspection should be a regular routine. At least every six shifts (oftener in tough digging) inspect your machine completely. Be sure all nuts and cap-screws are tight.

Follow carefully your manufacturer's recommendations for care and maintenance. Lubricate regularly in accordance with instructions. Use only good lubricants. Keep oil and grease and fittings free from dirt or grit.

Watch the little things. Anticipate troubles; don't wait until they arise. Keep machine clean so you can see trouble start.

Time is precious. Your excavator has important work to do in this war we're fighting. Make sure it is kept in tip top fighting condition by giving it the best possible care constantly.

ARMY E NAVY

Bucyrus-Erie employees have accepted the award of the Army-Navy "E" as a challenge to keep production rising. * *

Bucyrus-Erie

SOUTH MILWAUKEE • WISCONSIN • U.S.A.

FREE!
OPERATOR'S MANUAL
GENERAL DESCRIPTION AND CHARACTERISTICS - Continued
OPERATOR'S MAINTENANCE & ADJUSTMENTS ON PUMP
OPERATOR'S MAINTENANCE & ADJUSTMENTS ON PUMP - Cont'd
PLATE 61

Operators and Maintenance Manual *for*

NOVO Diaphragm Pumps

Give your pump the proper care for long efficient life

FOR all NOVO Model AD Diaphragm Pump owners, we have a new 50-page book on how to care for these pumps, how to get long life and the best service. Give size of your pump, 3" or 4".

These pumps and their power units, are practically taken apart right before your eyes. Any operator can understand the instructions for operation and maintenance regardless of his previous experience.

How to change a Diaphragm quickly.
How to clean or change pump valves—points of lubrication and wear.
Engine adjustments.....Tappet and bearing adjustments
Valve timing and grinding.....Proper lubrication, etc.

Disassembled (explosion) views are shown from which to order parts. Each assembly illustrated with parts disassembled, but in the proper order. Every nut, stud, and lock washer shown. You can't go wrong even if you don't know the name of the part—just give the reference number on the part and the plate and page number.

An added Service for NOVO Pump Owners.

Send for your free copy. Give the size 3" or 4". Factory overhaul of engine here.

FACTORY OVERHAUL OF ENGINE

A factory overhaul for your Novo Engine regardless of the equipment on which it is mounted, Pump, Hoist, Mixer, Light Plant, etc., will make the heart of that equipment practically new and these jobs carry a new equipment guarantee—See your Novo Distributor or write us for full information.

NOVO ENGINE COMPANY LANSING MICHIGAN

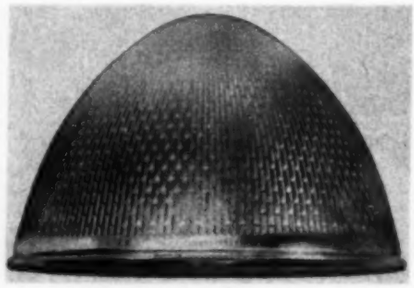
NOVO ENGINE COMPANY, Lansing, Michigan
214 Porter Street
Please send me copy of your Operator's and Maintenance Manual. The size of my pump is AD-3"..... AD-4".....
Descriptive literature on Diaphragm pumps..... Self-Priming pumps..... Pressure pumps.....
Information on NOVO Engine Factory Overhaul.....
NAME.....
ADDRESS.....
CITY.....STATE.....

GYPSUM EXTERIOR WALLBOARD, designed especially for speedy wartime construction, enables constructor to erect 20 sq. ft. of durable, weatherproof rigid and fire-resistant wall in 2 min. Board which is called "Certain-teed

Bestwall," is available in large panels, 24 or 48 in. wide and 8, 9 and 10 ft. long. Any carpenter can apply panels directly to wall studs. In order to save lumber through use of non-critical materials board may be surfaced with "Millerized" asphalt roofing. — **Certain-teed Products Co., 120 S. LaSalle St., Chicago, Ill.**

★ ★ ★

SMOOTH SURFACED GLOBE for street and highway lighting is of pressed construction, resulting in more uniform pattern and light distribution. Pressing process produces smooth, rounded, "chip-proof" fitter edge which gives added strength and structural support to



globe. Available in two types, long and short. Finished on inside with rectilinear configurations through which light rays are diffused horizontally. Smooth outside surface retards collection of dust and dirt as there are no grooves to accumulate smoke and grease film. Scrub-brush cleaning is no longer necessary, and time required for cleaning and drying has been cut in half. — **Westinghouse Electric & Manufacturing Co., Lighting Division, Edgewater Park, Cleveland, Ohio.**

★ ★ ★

NON-METALLIC DRAIN AND SEWER PIPE made of cellulose fiber impregnated with coal tar pitch is recommended to replace dwindling supplies of metal pipe for industrial, home and farm uses wherever pressure is not high. Claimed to be resistant to moisture, tuberculation, root growth, corrosion and most dilute inorganic acids and alkalies. Durable, light, installed easily and cut to desired lengths with ordinary wood-working saw. Couplings maintain pipe lengths in line and provide

Baker Hydraulic Bulldozers Do the "Barbering"

Contractors and road builders who have piloted Bakers through piney woods and forests would get a kick out of the way cat-skinners in uniform are using them to clear patches of jungles that are as tangled as spaghetti, sloshing through mangrove swamps that were yesterday thought impenetrable.

When the peace treaties are signed and the big post-war rebuilding job gets underway, ask the vets who saw the amazing job Bakers did — ask the boys who ran them what they think of *direct hydraulic lift and full down pressure on the blade* — of Baker's fast, positive action and ease of maintenance. Then, you'll want Bakers, too!

THE BAKER MFG. CO.

"If it concerns Victory, it concerns us"

568 Stanford Avenue

Springfield, Illinois

News from "Down Under"

War Correspondent: "This isn't like the Spanish-American War, is it?"

Army Engineer: "Hell, no! Malaria, typhoid and dengue were our worst enemies then, I believe."

W.C.: "This war seems more than a matter of fighters and guns. I notice a lot of construction machinery in use in this neck of the woods."

A.E.: "Yes, this war tops all others when it comes to the use of equipment such as you see along highways and around building projects all over the States in peace-time. Take those bulldozers over there — it'd be tough goin' without those babies—not only here, but on all our fronts."

W.C.: "I suppose it would be a tough job carving landing fields and roads out of that dense tropical growth without those rigs?"

A.E.: "Tough job? It would be practically impossible! You see, those dozers bowl over trees, tear out matted bougainvillaea, grub out roots that would quickly start growing again if you didn't eradicate them, fill up the holes that are left and level smooth as a pool table, ready for surfacing — do it single-handed."

W.C.: "How do the Nips do it?"

A.E.: "Mainly with 'rice burners,' using picks and shovels. These bulldozers are our ace in the hole. When Nip captives see how we do it, they lose their superiority complex, but pronto."

(Based on a news story, "Yank Engineers 'Lift' Faces of South Sea Isles," by E. R. Noderer, Chicago Tribune ace war correspondent.)

BAKER

The Modern Tractor Equipment Line for

EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

WILLIAMS *Buckets*

WELDED ROLLED STEEL CONSTRUCTION

eliminates cumbersome dead weight and insures a stronger bucket that will wear longer with less breakage and less cost for maintenance.

This welded design which has made Williams Buckets so universally used in steel mill service is now featured in all Williams Clamshell and Dragline Buckets. 3/8 to 16½ yd. capacities.

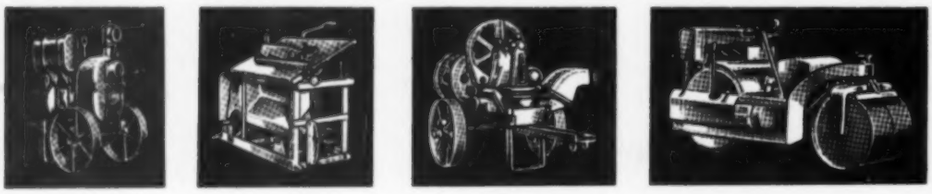
Send for free bulletin covering types of buckets for your particular requirements. It shows details of design and many exclusive features that clearly prove why YOUR NEXT BUCKET SHOULD BE A WILLIAMS.

BUILT TO LAST AND MOVE DIRT FAST

ARMY (E) NAVY

THE WELLMAN ENGINEERING CO.
7017 CENTRAL AVENUE CLEVELAND, OHIO

Built by WELLMAN



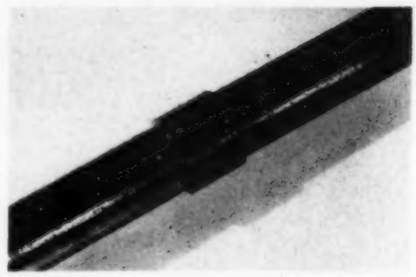
YOU CAN DEPEND ON C.H.&E. CONTRACTOR'S EQUIPMENT

SAW RIGS
PUMPS
HOISTS
ROLLERS
BAR CUTTERS
AND BENDERS

Contractors need no "sales arguments" on the value and performance of "C. H. & E." Equipment. It has a record covering 33 years. There are over 30,000 "C. H. & E." machines in the field. Today when Quality in equipment counts more than ever, remember you get from "C. H. & E." construction tools that are designed and built for fast hard work, efficient results, long life, low maintenance costs.

●WRITE FOR COMPLETE CATALOG
covering all items shown here, and let us send you specific information on the particular machine in which you are most interested. All inquiries promptly answered.

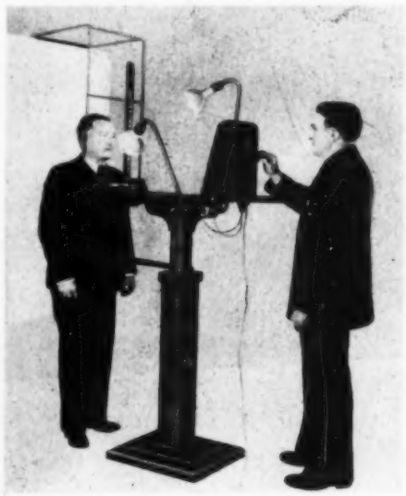
C.H.&E. Contractors Equipment
MANUFACTURING COMPANY
3847 No. Palmer St., Milwaukee, Wis.



tight joints, if desired. Manufactured in perforated and non-perforated lengths, former designed especially for septic tank filter beds and foundation footing and field drainage. Advantages: (1) Does not corrode or disintegrate; (2) does not crack if it freezes or thaws; (3) does not clog with root growth. — **The Fibre Conduit Co., 292 Madison Ave., New York City.**

★ ★ ★

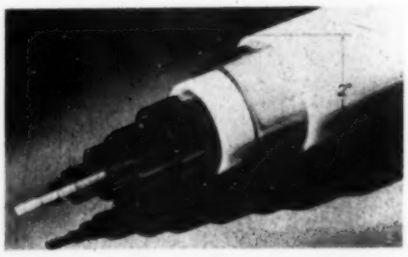
IMPROVED IDENTIFICATION UNIT has white, washable background, self-leveling easel base, increased counterweight capacity, finger-printing equipment, easily demountable



light brackets for increased portability, elevator-can't-slip ratchet lock, and choice of size of numbers. Absolute accurate height indicator is outstanding feature, but may be easily removed, if desired. — **Photographic Equipment, Inc., 210 East Park Way, Pittsburgh, Pa.**

★ ★ ★

SEAMLESS PLASTIC TUBING. "Tulox TT," is now available in all diameters up to 2 in. O.D. It is planned to increase range to 2½ in., O.D. to meet war production requirements. Ex-



truded from Tennessee Eastman cellulose acetate butyrate, this tubing is available from warehouse stocks throughout country through — **Crane Co., 158 N. Jefferson St., Chicago, Ill., and Julius Blum & Co., Inc., 532 W. 22nd St., New York City.**

SMOOTH runways for smooth landings

LIKE BUSY HIGHWAYS . . . airport runways and taxiing surfaces have to be kept free of snow and ice throughout long northern winters!

VINSOL*-TREATED CEMENT RESISTS SCALING

This necessity has created a serious problem for both contractor and operator . . . because constant freezing, thawing, and the action of de-icing agents tend to destroy the surface of concrete, causing it to crack and scale.

Vinsol*-treated Cement Provides Answer!

Experiences of leading cement companies, highway departments, and engineering consultants show that Vinsol-treated cement resists scaling under the most severe weather and de-icing conditions. When Vinsol-treated cement has been laid side by side with normal portland cement, it has shown no tendency to scale, while the normal portland has scaled right up to the separation joints!

Contractors Enthusiastic!

Furthermore, contractors using Vinsol-treated cement report that it saves time and money in laying. Not only is it easier and quicker to spread but it is faster to finish. Because there is less bleeding and segregation, crews are able to work closer to the mixer and thus keep up to schedules.

Ask Your Cement Supplier!

Your supplier probably has Vinsol-treated cement with full instructions for its use. We have published a 44-page compilation of articles prepared by engineering authorities. Everyone working with cement should read this booklet, "Better Roads Ahead." Fill out and mail the coupon below for your copy.

*Reg. U. S. Pat. Off.

Specify Vinsol-treated Cement for Longer Surface Life

NAVAL STORES DEPARTMENT
HERCULES POWDER COMPANY
INCORPORATED
974 MARKET ST., WILMINGTON, DELAWARE

Gentlemen:
Please send me a copy of 44-page book, Better Roads Ahead, telling the complete story of Vinsol-treated cement.

Name_____
Company_____ Title_____
Address_____
City_____ State_____
LL-92

WHAT YOU CAN DO TO HELP THE WAR EFFORT!

Take good care of everything you own. This means literally everything . . . your business equipment, home appliances, automobile, clothing, furniture, kitchen utensils and other items too numerous to mention. The less replacement of civilian necessities of life is required, the more of the national effort can be devoted to war.

Make every effort to keep in good health. Illness not only keeps you away from the job but may add to the already heavy burden of the doctors still in civilian practice and the hospitals that are operating under difficulties.

Be as economical as possible in the use of food, fuel and all kinds of household supplies. Even those products of which there are ample supplies in this country must be transported and all transport facilities are heavily burdened.

Before making a telephone call, ask yourself if it is really necessary. The telephone lines are congested with war business and material is not available to permit expansion of communication systems.

Reduce traveling as much as possible. It is hardly necessary to stress the importance of curtailed automobile travel. As for rail travel, the railroads are handling a tremendous and mounting load. No new passenger equipment is being built. Existing cars and locomotives must handle the traffic.

Comb your property for scrap iron and steel, rubber, copper and rags; turn these things in through local salvage channels.

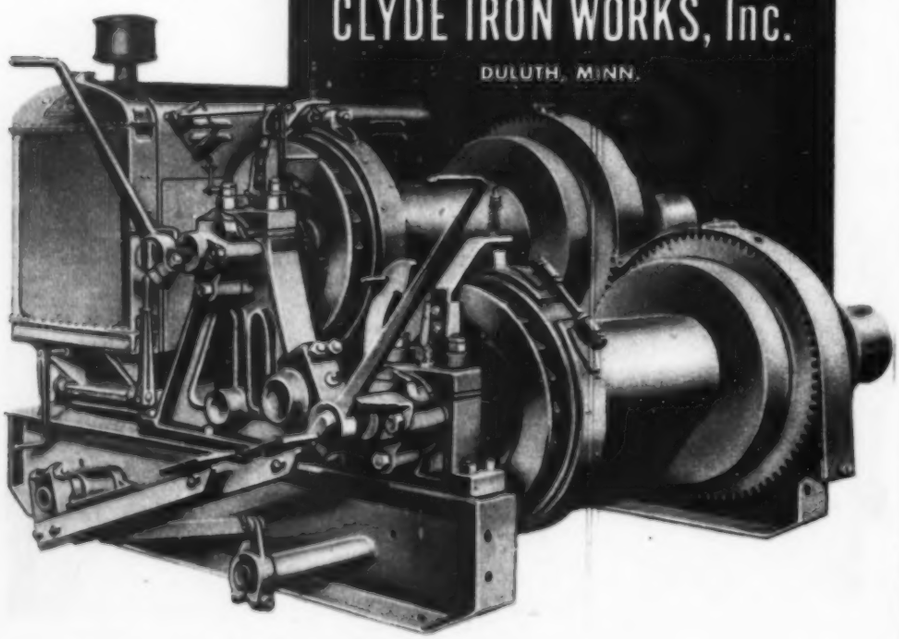
Take extra good care of your construction equipment. Instruct your operator or maintenance man to give periodic check ups to replace dangerously worn parts; lubricate thoroughly at the required intervals; keep all wearing parts adjusted for efficient performance; paint when necessary to prevent rust and take precautions to protect radiators and pipes from freezing.

ARMY E NAVY
For Outstanding Achievement

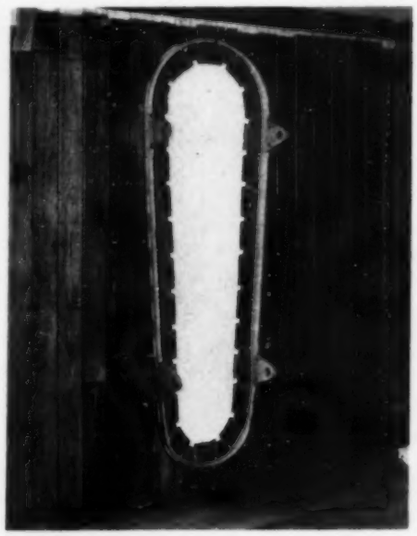
CLYDE

CLYDE IRON WORKS, Inc.

DULUTH, MINN.



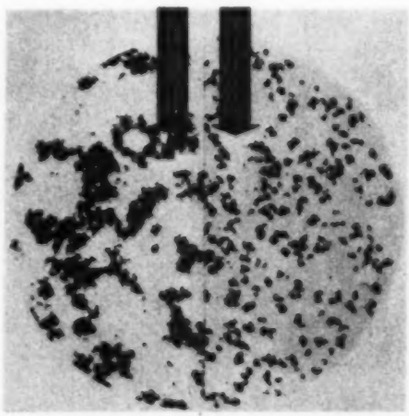
ALL-WOOD STRETCHER COTS, known as "Stretcherkots" are especially recommended for light weight, ease of handling, low cost and because they are made of non-critical materials instead of steel tubing, to first-aid stations, industrial plants, business offices, schools and the home. Injured or ill persons may be placed on them, delivered quickly by



ambulance, station wagon or truck to hospital or dressing station, treated, and left on Kot if conditions require. Tapered design permits two units, one head first, and one foot first to be placed side by side in station wagon. Coverings may be removed easily and laundered. Designed to hang on wall or to be stacked out of way, singly or in nests of two or three, ready for use. Made of all wood, Kot ends are processed to retain correct amount of spring. Weight, less than 12 lb.; length, 78 in.; width, 25 in.; height, 8 in.; frame, specially selected ash; fabric, No. 6 cotton duck; rope, solid braided cotton; packing, three to a bundle. — **Schilling Sales Co., 16 E. 40th St., New York City.**

★ ★ ★

IMPROVEMENT IN DIFFUSION OF PORTLAND CEMENT MIXTURES is made possible by use of Santorized Trimix liquid which improves dispersion of cement particles and automatically permits reduction of water ratio, thereby increasing compressive strength characteristic of concrete. These results are said

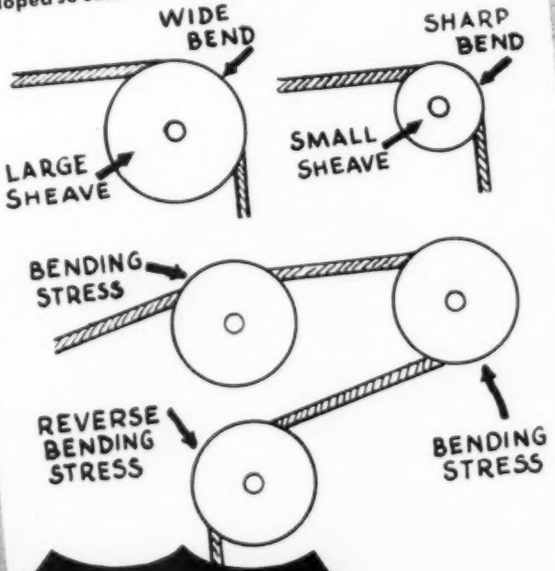


to be achieved without in any way interfering with normal hydration cycle of Portland cement. Glance at accompanying photomicrographs shows how action works. At left, illustration shows Portland cement gaged with plain water. Second illustration shows result when 1 qt. of Santorized Trimix to the bag of

HERE'S WHY You Wear Out Less Cable With HEIL Cable Scoops

FEWER, LARGER SHEAVES MINIMUM BENDING STRESS SHORTER CABLE LENGTH

The only thing that is better than a wide bend is no bend at all. Heil leverage action greatly reduces the number of sheaves. Maximum stresses result from sharp bends and reverse bends. Heil uses large diameter sheaves and eliminates reverse bends. Cable grooves are smooth-surfaced, not rough cast. Flanges are sloped so cable can ride up if a small stone gets caught.



. . . and Save Money on Cable Replacements!

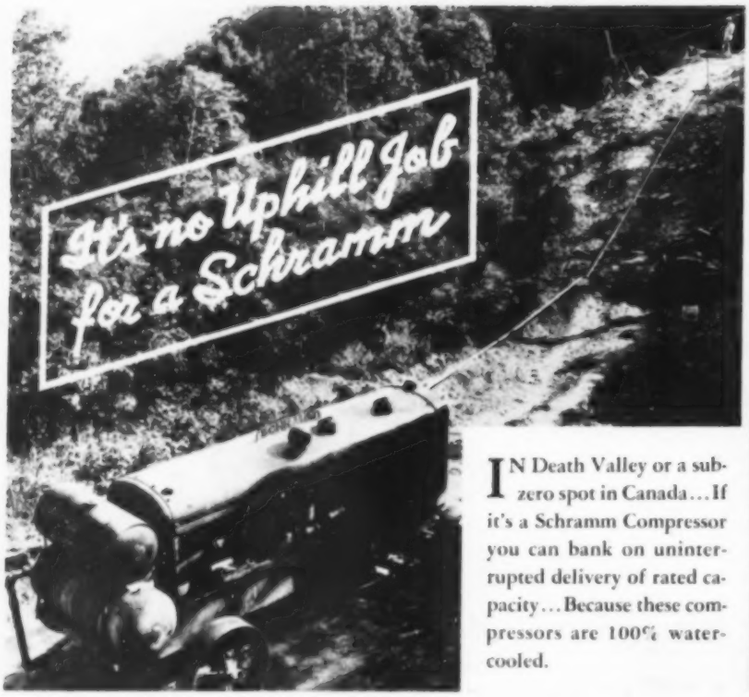
When Heil engineers developed the Heil Cable Scraper, they were not satisfied until they had achieved new simplicity in the use of cable. The Heil design therefore utilizes shorter lengths of cable and reduces to a minimum the continuous punishment of bending and unbending as it passes over and around the sheaves . . . Study the Heil Cable Scraper from any angle, and you find similar improvements to give you those heaping "bonus" loads faster and at lower cost — with steady, dependable service that gives *you* a reputation for dependability in finishing your jobs on time . . . Let us help you now to plan your post-war purchases of Heil dirt-moving equipment. Write for bulletins giving full details on Heil's advanced design.

R-10

The HEIL Company is engaged in all-out war production for *Victory*

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE, WISCONSIN



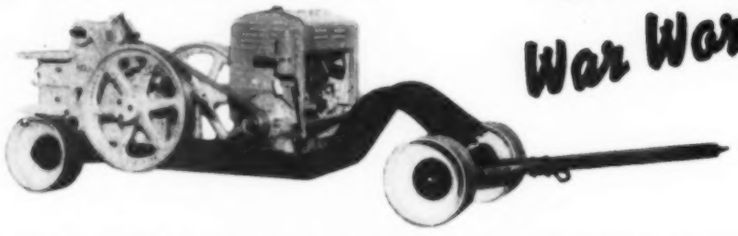
IN Death Valley or a sub-zero spot in Canada... If it's a Schramm Compressor you can bank on uninterrupted delivery of rated capacity... Because these compressors are 100% water-cooled.

Light Weight
Self Starting
Gasoline or Diesel Power
Compact Dimensions
Economical Engine Speed
Automatic Controls
Long Life
Force Feed Lubrication
Compressor Efficiency

SCHRAMM

THE COMPRESSOR PEOPLE
INCORPORATED
WEST CHESTER, PENNA.

Reliance will speed that War Work!



PORTABLE CRUSHING UNIT with V-BELT DRIVE

More CRUSHING with *least* EFFORT and POWER *plus* RUGGED DURABILITY

This speedy Reliance Portable Unit can be used with *equal profit* — 1st — as a Crusher alone, or — 2nd — in combination with Elevator, Chute, Screen, etc. Note the *low* feed opening at a *safe* distance from the balance wheels. Note the reliable *power-producing* V-Belt Drive. Note the low center of gravity for stability. For strength, simplicity and economy you can't beat this or any other *Reliance*.

● OTHER PRODUCTS — Reliance offers a complete line of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles, Bin Gates; Feeders; Belt Conveyors; Grisslies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.

UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y., U. S. A.
DISTRIBUTORS IN ALL PRINCIPAL CITIES OF U. S. A.

cement was used. Advantages of method: reduction of up to 20 per cent of normal volume of gaging water; greater workability of mortar. Slump tests show that when Trimix is added to gaging water in proper proportions, slump of normal 1:2 mix ranges from 6 to 7 in., as compared to 2½ in. with same amount of plain gaging water. Higher strength said to be obtained when Trimix is used because method imprisons gaging water, lowering evaporation and resulting in more thorough curing. — **L. Sonneborn Sons, Inc., 88 Lexington Ave., New York City.**

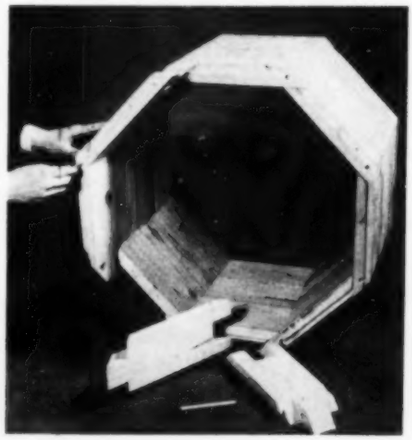
★ ★ ★

PROTECTIVE TURBAN FOR WOMEN WELDERS styled by John Frederics is said to be practical, comfortable to wear with or without helmet, to provide protection against flying sparks and to hold hair snugly in place. Of-

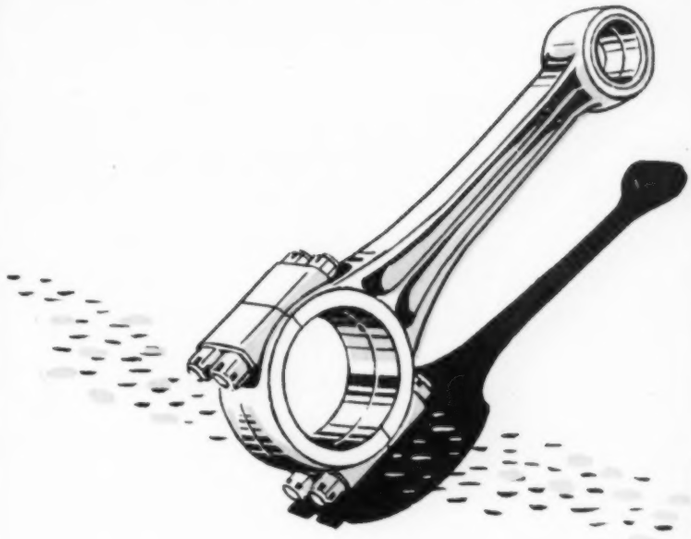
fered in lightweight gray or brown leather chrome tanned, and also in pin-striped dark gray cassimere. One-piece construction assembled by snaps only makes disassembling easy. Leather turban has no stitching; cassimere turban has hemmed edges. One size fits every type of head. — **American Optical Co., Southbridge, Mass.**

★ ★ ★

SECTIONAL WOOD PIPE CULVERT made of non-critical materials requiring no steel bands, nails or metal reinforcing is now replacing much corrugated metal pipe except in important locations on defense projects where no suitable substitutes can be found, such as airport runway drains under shallow



You can get a new hat in 5 minutes



...but it may take weeks to replace a burned-out bearing...

The answer is Preventive Maintenance now with Shell Diesel Lubricants

SHELL

The vital war metals used in bearings are becoming increasingly hard to get. Deliveries on present stocks are questionable. Yet, there are operators who are working their oil "overtime" in order to "save time and oil."

Driving even the best made oil beyond its limit of usefulness can cause sludge, plugged oil lines . . . ruined bearings.

Under today's peak-load conditions oil should be carefully watched, *and in many cases changed more often than usual,* depending on the type of service to which it is subjected.

Yes, changing the oil requires time. But the few minutes it does take may save days of delay later. Don't wait for a bearing failure. Call in the Shell man now. Let him help you plan your Preventive Maintenance.

SHELL DIESEL LUBRICANTS
AND SHELL "DIESELINE"

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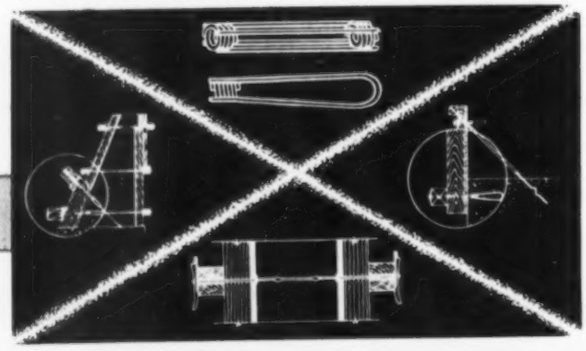
Sold in 1942 . . . Over 18,000,000 Prefabricated Units for Tying and Anchoring Concrete Form Work.

18 Million bought and paid for by all types of Builders and Contractors in all parts of the country prove that Richmond Form-Tying devices have distinctive advantages by which you, too, can benefit. The pictures below give you a quick idea.

For complete details, reach for your Architects or Engineering File or let us send you a complimentary copy of Richmond's Form-Ty Engineering Guide. Better still, let us sit down and pencil out the facts and figures for your next job.

SAFE LOAD CAPACITIES FROM 3000 to 30,000 lbs.



SEE OUR CATALOG IN SWEET'S

RICHMOND SCREW ANCHOR COMPANY, INC.

516 LIBERTY AVENUE · BROOKLYN, NEW YORK

TIME AND LABOR SAVING CONSTRUCTION DEVICES FOR CONCRETE CONSTRUCTION

cover and other locations of limited headroom or bad foundation conditions. Unlike ordinary rigid box type of structure, new pipe is made up of series of short, stout segments, octagonal in shape fabricated from various sizes of lumber according to load requirements and fastened together with wood dowels. Units are shop assembled or fabricated into units of 12 ft., or more, and are joined together in field into single structure. Thickness of wood segments can be varied with nominal diameter of pipe. Chief advantage of this pipe over other wooden types is its flexibility which enables it to build up side support and increases its load carrying capacity. Increased durability is assured by treating wood.—**Armco Drainage Products Assoc., Middletown, Ohio.**

* * *

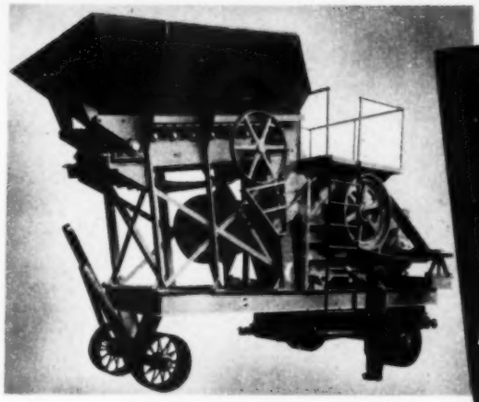
Skilled Specialists Needed for *Engineer Troop Units*

THE CORPS OF ENGINEERS announced recently a special recruiting drive for enlistment of technicians for voluntary induction as skilled specialists to be assigned to engineer troop units.

Under the plan announced by the Chief of Engineers, trained equipment operators who have been working as civilians on engineering and construction projects may, prior to their induction by Selective Service, volunteer for enlistment in the Engineers. The nearest Army engineer office will take their application, pass on their qualifications, and provide them with a letter to their Induction Station which will earmark them for duty with the Engineers. From the Induction Station they will be sent direct to Engineer training centers at Fort Belvoir, Virginia; Fort Leonard Wood, Missouri; Jefferson Barracks, Missouri; or Camp Claiborne, Louisiana.

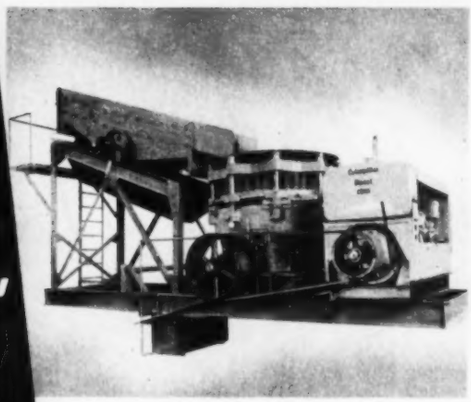
There are no age restrictions under this new enlistment program. All men over the ages of 18 who qualify in any one of 75 listed technical occupations will be accepted as an enlisted specialist in the Corps of Engineers.

The plan is designed to appeal to trained civilians who, as the Army's emergency construction program tapers off, are becoming subject to the draft. Thus earmarked for the Engineers, they can be advanced in grade as rapidly as their special training justifies.



Primary Unit of large Telsmith Portable Crushing-Screening Plant, including Apron Feeder, Primary Jaw Crusher, power unit and conveyor.

NO "Boots" or "Yardbirds" HERE!



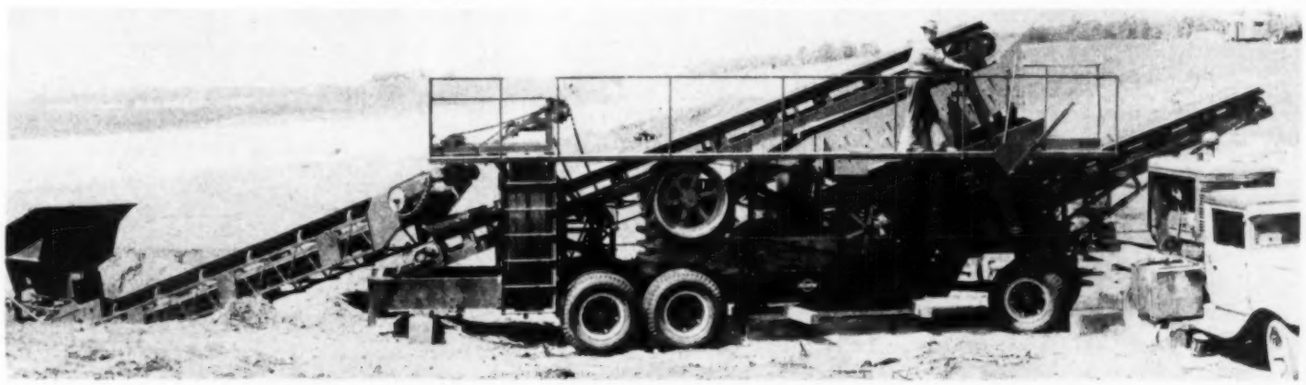
Secondary Crushing Unit of large Telsmith Semi-Portable Crushing-Screening Plant, including Scalping Pulsator Screen, No. 48 Gyrasphere Secondary Crusher, and power unit.

TELSMITH

Portable Crushing-Screening Plants are *Overseas Veterans* in Uncle Sam's Armed Forces

★ They're no rookies, these Telsmith Portable Crushing-Screening Plants. They finished "recruit training" in the armed forces long before Pearl Harbor. Telsmiths helped to build naval bases and docks, air bases, runways and aprons for flying fields, military highways and access roads over here. Then when the sailors, soldiers and marines went overseas, Telsmith Portables shipped out with 'em. They are serving on the first fronts, and on "the second front." And they're still going over. Like you road builders and contractors, Uncle Sam and his nephews, and the United Nations, too, appreciate Telsmith Portables. They turn out the aggregate *fast*—and economically—on large or small jobs. Their output is bigger; their sizing finer. Find out all about 'em, *get Bulletin P-10.*

Complete Telsmith Portable Dual Crushing-Screening Plant P-7



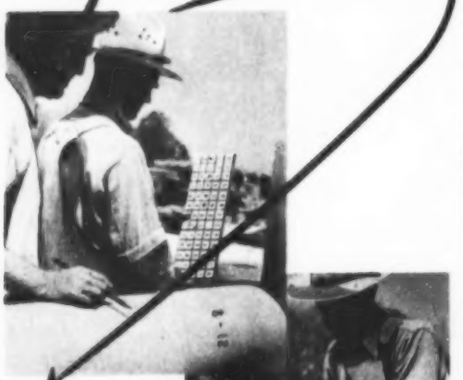
SMITH ENGINEERING WORKS, 510 EAST CAPITOL DRIVE, MILWAUKEE, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

Room 1604—50 East 42nd St. New York City | 211 W. Wacker Drive Chicago, Ill. | 713 Commercial Trust Bldg. Philadelphia, Pa. | 19-21 Charles St. Cambridge, Mass. | G. F. Seeley & Co. Toronto, Ont. | Mines Eng. & Equip. Co. San Francisco—Los Angeles

Brandeis M. & S. Co. Louisville, Ky. | Charleston Tractor & Eqpt. Corp. Charleston, W. Va. | Roanoke Trac. & Eqpt. Co. Roanoke, Va. | Clift L. Priester 911 S. 3rd St., Memphis, Tenn. | Wilson-Weesner-Wilkinson Co. Knoxville and Nashville, Tenn.

65 Concrete Pier Forms



One man can make them in a few hours with

Sonotube

PAT. APP. FOR

made to size laminated fibre tubing lengths up to 24 feet

Requiring no critical materials, SONOTUBE is the fastest known method of making concrete pier forms. Simply figure lengths—cut to size—place on footings—back-fill or minimum brace, and pour.

5 Standard Sizes

9"	10"	11¼"	12"	13½"	Inside Diam.
64	78.54	100	113.1	144	Sq. Inches

Immediate Delivery

Widely used and Approved for Cantonments and other Government Construction — U. S. Army Engineers; U. S. Navy Department Yards and Docks; P. B. A. and F. H. A.

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NEWS FROM MANUFACTURERS *About Their Products*

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

CONCRETE PLACING BY PIPE LINE—**Chain Belt Co.**, Milwaukee, Wis. (164 pp., illustrated) Second edition of Pumpcrete Practice, a manual of concrete placement by Pumpcrete, is now available for use of contractors, engineers, estimators and operating men. Intended to acquaint inexperienced users and those to whom system is relatively new with fundamentals of sound and economical practice and to answer question, "Is it a Pumpcrete job?" Bulletin has also been made source of reference for any user of this method who encounters new problems from time to time and who wishes to avoid getting his experience the hard way. Subjects treated: (1) Comprehensive explanation by specific examples of Pumpcrete method; (2) placing costs by comparison with other methods and by estimates on various jobs; (3) distributing methods for all types of construction; (4) mixing plants and their relation to Pumpcrete setup; (5) concrete data—advice on obtaining best results in pumping various mixes; (6) Pumpcrete data—cost of average plant, unit prices; (7) typical jobs on which Pumpcrete is used.

★ ★ ★

RUBBER PRODUCTS — **The B. F. Goodrich Co.**, Akron, Ohio. (30 pp., illustrated.) Rubber guide book for American war industries, lists application and properties of many types of products using natural, synthetic or reclaimed rubber. Booklet is divided into eleven indexed sections, under following headings: Properties of Ameripol (synthetic rubber compounds) hydraulic equipment parts, sponge products, industrial rubber gloves, extruded rubber goods, Anode process of rubber coverings, industrial and aeronautical molded goods, hard rubber parts, rubber cements, lathe cut rubber goods, and properties of reclaimed rubber.

★ ★ ★

FLOOR PATCH—**Flexrock Co.**, 23rd and Manning St., Philadelphia, Pa. (4-p. folder, illustrated) Describes product called "Instant-Use Resurfacer" for patching ruts and holes in concrete of aisleways, gasoline stations, freight platforms, ramps and all traffic areas. Claimed to be quick and easy to use, to be sparkproof, to hold tightly to old concrete. Also for use in patching cracks or leaks in underground rooms, tanks, tunnels, subways, reservoirs and dams, and roofs.

★ ★ ★

INCREASED WELDING PRODUCTION—**The Lincoln Electric Co.**, Cleveland, Ohio. (42-p. booklet, illustrated) Contents divided into fifteen different sections, each of which contains up-to-date information on specific phases of arc welding such as "Factors Affecting Speed and Cost," "Justifying Amount of Equipment for Fit-Up," "Where, When and How to Weave." Profusely illustrated and carries many charts and tables that are helpful in choosing correct electrode, applying most suitable welding technique, estimating speeds and costs of various welding jobs and other data that will help reduce costs and increase welding production.

Mall HORSE POWER SERVES FOR MAN POWER ON 8 VITAL JOBS

VIBRATING — places low-water-cement ratio concrete better and faster than hand puddling. Saves sand, water and cement. It eliminates honeycombs, voids and expensive hand patching. It also assures a better bond with reinforcement and permits an earlier stripping of forms.

WET RUBBING — one man can put a finer finish on 5 times the area possible with hand methods.

SAWING — squaring form boards to size and salvaging waste pieces for bracers, etc., with circular saw.

SANDING — saves time and lumber as form boards can be cleaned and feather-edged for further use right on the job.

PUMPING — excavations — 1500 g.p.h. at 10 ft. head.

DRILLING — in wood, steel, brick and concrete.

ALSO WIRE BRUSHING and SHARPENING TOOLS.

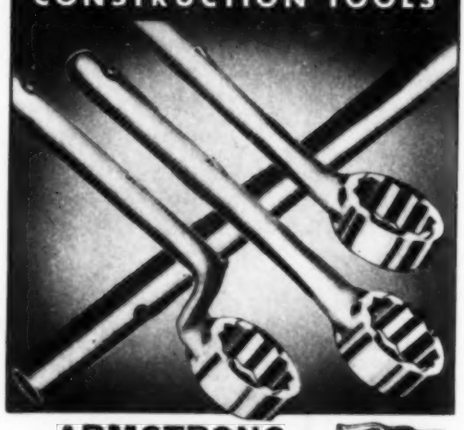
Air cooled gasoline engine delivers variable speeds from 1000 to 3700 r.p.m. to the 8 quickly interchangeable tools for the jobs above. Engine uses very little fuel.

Available for VICTORY Construction — full details upon request.

MALL TOOL COMPANY

7757 South Chicago Ave. Chicago, Illinois

ARMSTRONG CONSTRUCTION TOOLS



ARMSTRONG STUB END WRENCHES

Built for the heaviest construction work, these husky drop forged Chrome-Vanadium Steel, heavy wall box wrenches take long, slip-over tubular steel handles that permit tremendous leverage. Positive safety locking device and forged-in stop prevents handle slippage. Handle easily removed so nuts can be quickly "run up" and then with handle attached, securely set. 3 types, "Straight," "15° Angle" and "Off Set." A single seamless tubular handle serves all (can take one in each end). 25 sizes, take nuts from 1¼" to 3½" dia. 25", 30", 36" or 42" handles. All openings are double hex (12 point) take square or hex nuts.

Write for Catalog

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

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Eastern Warehouse & Sales: 199 Lafayette St., New York

FOR OWNERS AND OPERATORS OF SHOVELS-DRAGLINES-CRANES

- *Helpful Hints on Maintenance*
- *On-The-Job Stories*
- *Interesting Features*

LINK-BELT SPEEDER NEWS

OVER 300,000,000 CU. FT. OF SILICA SAND IN 43 YEARS

Seafaring Tankers from Inland Waters

Illinois Silica Sand Serves Our War Effort in Many Ways

"Big Inch" Pipeline Nears Completion

Steam for Manhattan's High Buildings Piped from Huge Generating Plants on River

ANOTHER SHARE-THE-RIDE IDEA

LINK-BELT SPEEDER NEWS . . . . like every Link-Belt Speeder machine—is doing an important war job today. Each issue contains a down-to-earth article on some phase of servicing for better operation, greater output, longer life; together with stories and features of particular interest to men who own, operate and maintain contractors' and industrial equipment. Always a refreshing stimulant to old-timers, this monthly paper now also is a source of "quick experience" for men who are new on the job. Use coupon if you are not on the mailing list.

Here are a few of the interesting articles which recently appeared in the LINK-BELT SPEEDER NEWS

"Builds ships faster in 'bathtubs' at South Portland, Me."

"Triple-duty machine works as crane, shovel, clamshell on California housing project"

"Alert teamwork adds much to the service that you can get from your equipment"

"Prizes for your tips on operation and maintenance"

"A routine of daily inspection will enable your equipment to do more and last much longer"

"How to keep clutches at top efficiency"

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301 West Pershing Road
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Gentlemen: I would like to receive the Link-Belt Speeder News for the next six months.

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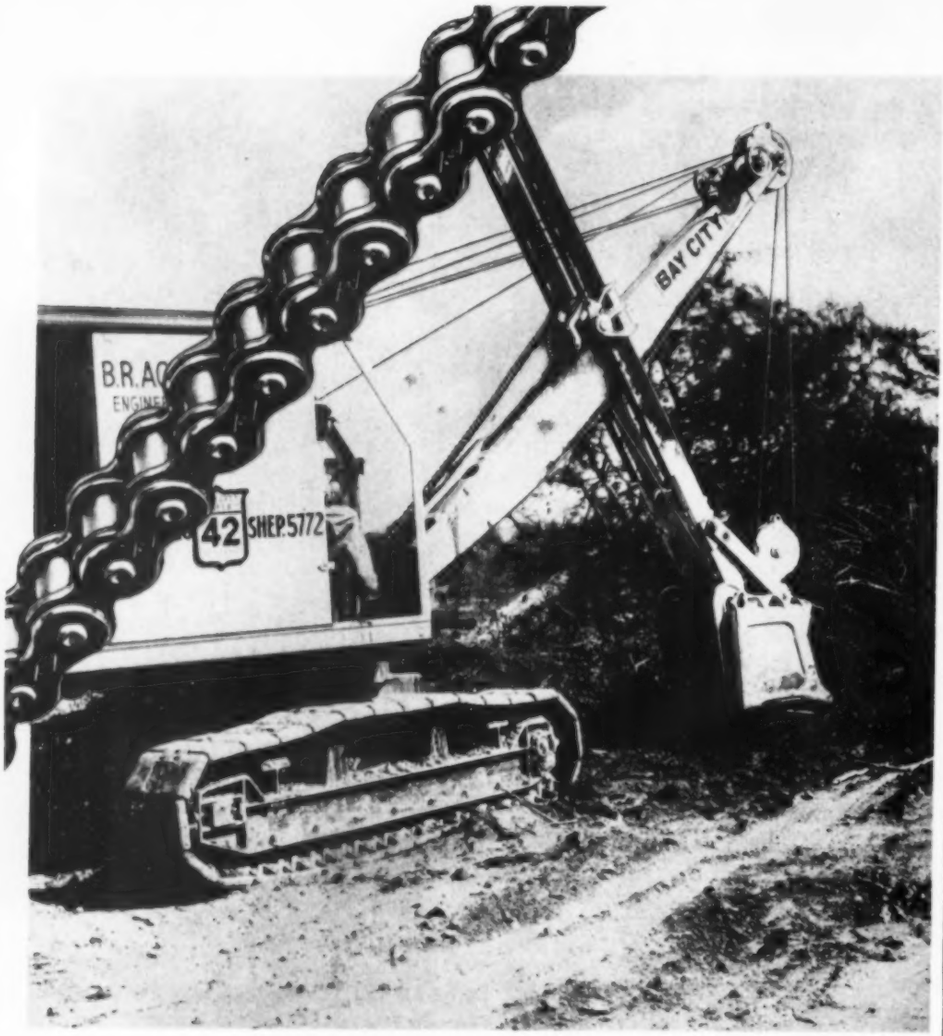
LINK-BELT SPEEDER

BUILDERS OF THE MOST COMPLETE LINE OF SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO, ILL.
(A DIVISION OF LINK-BELT COMPANY)



THE BETTER THE CROWD THE BIGGER THE BITE

With a full bite and sure control of the bucket — you can expect more daily yardage, and a quicker return on your shovel investment. The important crowd drive engineered by Bay City Shovel engineers is Diamond Roller Chain — as precisely made as the extremely accurate and efficient DIAMOND engine timing drives — and as strong as those used on modern deep-well oil drilling rigs, — or driving heavy production machinery in industrial plants.

Such drives can "take it", — can stand up under shock loading, and operate long hours with minimum care and maintenance. Such drives,—Diamond Roller Chains,— are used for many purposes by leading makers of all types of construction machinery. . . . DIAMOND CHAIN & MFG. CO., 418 Kentucky Avenue, Indianapolis, Ind. Offices and Distributors in All Principal Cities.

DIAMOND ROLLER CHAINS

PAINT SELECTOR—**American-Marietta Co.,** 43 E. Ohio St., Chicago, Ill. (two charts). Handy means of selecting best paint without detailed technical study of properties of all finishes that might be suitable for given application is provided by Valdura Paint Selector. Consists of two charts which make available to architects, contractors, purchasing officials, dealers and plant and building maintenance engineers all information on properties of and application data necessary to make proper selection from forty-three paint, enamel and varnish products. Fifty-one divisions on first chart list all sizes and types of surfaces encountered in industrial, commercial and residential painting. Second chart facilitates selection of most suitable finish, includes information as to whether finish may be used under water or over graphite paint; maximum heat resistance in degrees F.; relative resistance to alkalies, acids, moisture, abrasion, sun and oil; coverage and drying time. Chart also lists most suitable thinner and primer for each type of paint.

★ ★ ★

WATERPROOFING MINERAL PAINT—**Modern Waterproofing Paint Co.,** 1270 Sixth Ave., New York City. (6-p. folder, two color) Brief description of new waterproof paint named "Aquella", a white powder composed of properly balanced organic ingredients, which, because of minutely dispersed aggregates, is said to close smallest pores of wall. Applied to surface of wet, unpainted brick, cement or concrete walls subjected to water seepage, paint forms permanent bond with wall. Makers claim that it does not peel, blister or flake. May be applied to brick, cement and concrete walls of basements and interior walls of houses subject to dampness, moisture or water infiltration due to rain or other causes. Shipped in bags and drums and is prepared 15 min. before using. Application may be made in one or two coats according to amount of moisture present in walls. Gives directions for preparing paint and data on covering power. Tells how to prepare wall before applying Aquella and how to remove whitewash and paint from walls to be treated. Lists results of tests made with paint on brick and concrete walls.

★ ★ ★

EMERGENCY WOOD PIPE—**Armco-Drainage Products Assoc.,** Middletown, Ohio. (8 pp., illustrated) Describes and illustrates pipe that will meet emergency conditions and that will conserve metal. Said to be light in weight and adequately strong. Saves transportation, trucks, tires and railroad cars and after the war may be made into permanent structures.

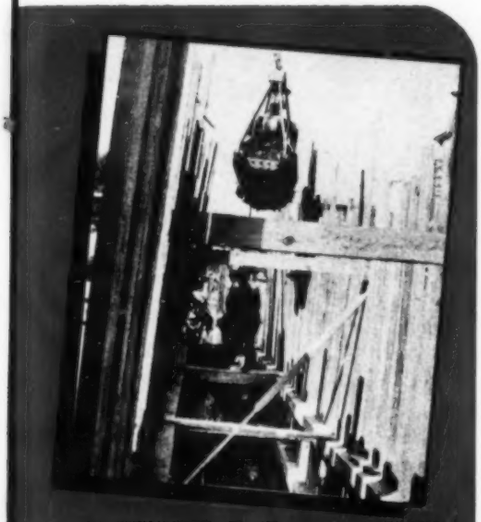
★ ★ ★

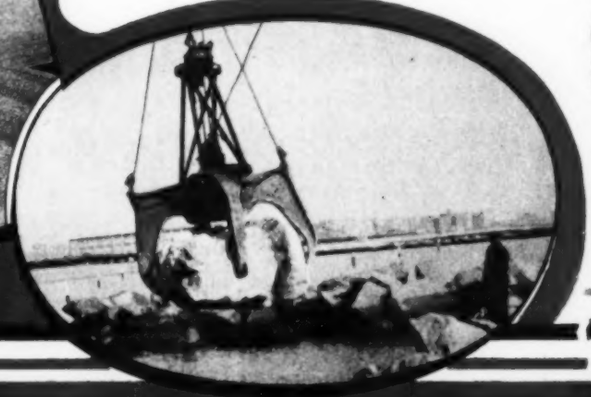
CONSERVATION OF CONSTRUCTION EQUIPMENT AND FACILITIES—**Associated General Contractors of America** (80-p. book, pocket size). Published as an aid to war effort. Opening chapter, entitled "Plant Layout," presents suggestions for laying out construction project to conserve manpower and economize in use of critical materials. Second section called "Construction Equipment," presents basic principles governing use, care and repair of equipment. Other chapters are devoted to internal combustion engines, electric equipment, automobiles and trucks, small tools, rubber, wire rope and manila and hemp rope, tarpaulins and canvas, scaffolding and steel piling and forms. In "Glossary of Maintenance Hints" is given list of construction machines with specific points that require special attention and suggestions for preventing and curing trouble. Final chapter devoted to salvage and reclamation. Includes manufacturer reference list for use in case contact with various makers of equipment is desired. Copies are available from Construction Foundation, Munsey Bldg., Washington, D.C., at 50¢ each, $5.00 per dozen and $25.00 per hundred.

Clamshells

versus

Bombshells





OWEN BUCKETS & GRAPPLES

SINCE DEFENSE and OFFENSE begin with *construction,* Owen Buckets and Grapples are predominantly in the forefront of activity in plants and fortresses throughout the world.

Their efficiency will aid in speeding production—in lessening the effectiveness of bombs and shells—and in speeding the inevitable day of victory.

There are Owen Buckets for every digging and handling use—and Owen Grapples for every stone handling requirement.

THE OWEN BUCKET CO.

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Branches: New York • Philadelphia • Chicago • Berkeley, Calif.

Bases for BOMBERS
Made by HERCULES—
Delivered by HERCULES

Besides HERCULES Hoists and Dump Bodies for civilian use and the huge Cargo Bodies produced for the U. S. Army, thousands of Airplane Landing Mats for emergency "Bomber Bases" have been turned out by the big Hercules plant the past year. HERCULES Dump Cargo Bodies, like the one shown above, mounted on a Chevrolet chassis, are used for transporting such materials on many fronts.

REMEMBER THESE "HERCULES" FEATURES!

- Exclusive Center-Lift Hoist Action
- Double Bridge-type Lift Arms
- Balanced Piston Valve, with finger-tip control
- 6", 7", 8" and 10" Hoists

Heavy production for war will continue in all lines until victory is won, but if your need is essential, your Hercules distributor can take care of you.

HERCULES STEEL PRODUCTS COMPANY
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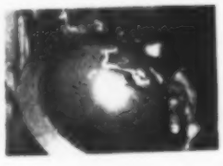
STRAUSS

PROTECTOR HELMET SAVES WORKER'S LIFE



A worker's life was spared today when a steel clip plummeted 30 feet and struck the helmet he was wearing. The illustration shows the clip and the Strauss helmet that absorbed the force of the blow. The uninjured worker immediately after the near-tragedy hurried to the safety office to secure a new protective chapeau.

Insure the lives of your workers by specifying STRAUSS PROTECTOR HELMETS. This vulcanized fibre positively will not deteriorate in rain or heat. In fact, THEY GET TOUGHER WITH AGE. For added protection the crown is reinforced with a second piece of pre-formed fibre. Write for information.

STRAUSS SAFETY BELTS also meet every individual hazard. Ask for complete catalog.

The **STRAUSS** Company
850 EWART BUILDING, LIBERTY AVE., PITTSBURGH, PA.
SAFETY HATS and CAPS • SAFETY BELTS and HARNESS

FILM CURING OF CONCRETE—**The Johnson-March Corporation.** 52 Vanderbilt Ave., New York City. (4-p. bulletin) Compilation of data on results of concrete curing tests with Ritecure, in relation to pavement's moisture retention qualities, its resistance to wear and its compressive strength. Lists advantages to be obtained in using this film-curing agent and illustrates ten jobs on which it was used.

★ ★ ★

STRIP STEEL—**Stran-Steel Division, Great Lakes Steel Corp.,** Penobscot Bldg., Detroit, Mich. (12 pp., illustrated). Designed to furnish information for use by architects, builders and designers in formulating plans for post-war era when steel will again be available for general construction purposes. Of noteworthy interest are two features pertaining to the versatility of strip steel as a building material. First: Stran-Steel is now rolled to a curve in the same operation which forms the nailing groove, the forming being done cold. Result: buildings framed from the arched member thus formed require less material—framing, roofing, insulation. Second: Structural member is made entirely from strip steel cold-formed to shape, resulting in economy of material because strip steel can be rolled into number of thicknesses to produce members that more closely fit design requirements. There is greater latitude in choosing members than is available with conventional sections. Buildings framed completely in C-sections have been designed for clear spans up to 130 ft.

★ ★ ★

HOW TO SELECT AND APPLY MOTOR CONTROL—**General Electric Co.,** Schenectady, N. Y. (16-p. manual, illustrated) "Simplified Guide to Selection and Application of Commonly Used Motor Controls" is title of treatise on proper method of selecting and applying motor control, popularly called the brains of electric drive. Starting with a simple analysis of the functions of control, booklet next describes basic control parts of industrial devices. Following this is discussion of correct control, with explanations of how to choose between manual or magnetic and when reduced-voltage starting is necessary. Other subjects treated: progressive breakdown of standard controls available, their operation and function, and description of inclosures for industrial control devices.

★ ★ ★

WELDING AND BRAZING ALUMINUM—**Aluminum Company of America.** Pittsburgh, Pa. (100 pp., illustrated) Completely rewritten edition of Alcoa welding booklet with added treatise on the art of brazing. Chapters: (1) Welding Alcoa Aluminum; (2) Gas Welding; (3) Arc Welding; (4) Inspection and Specifications for Gas and Arc Welding; (5) Electric Resistance Welding; (6) Brazing.

★ ★ ★

ALL-WHEEL DRIVE FOR TRUCKS, COMMERCIAL AND PASSENGER CARS—**Marmon-Herrington Co., Inc.,** Indianapolis, Ind. (16-pp. folder, illustrated) Describes and illustrates advantages of power and traction applied through all wheels for men who have roads to build and maintain, snow to remove, oil to find, logs to haul and utility lines to build and service. Explains how conversion to all-wheel drive combines lower gear ratios with pulling power, maneuverability, stamina and economy of operation which are impossible to obtain in any other vehicle of similar rated capacity. Larger tires, specially chosen for the job increase traction, flotation and clearance. Heavier front springs for snow plow work are available.

How to dig V-ditches with LeTourneau ANGLEDOZERS

Another Time-Saving LeTourneau Method for Making Tractor Power Go Further

Sure, you can build V-ditches quickly and easily with LeTourneau Angledozers, just as so many other successful operators do when regular ditching machinery isn't handy or available. Here's how:

With Angledozer blade angled, make a short pass to get a windrow about 2 track lengths long. Then back up and place one track on the windrow — this tilts the whole machine toward the bottom of the proposed V. Next tilt the blade corner to the low side, the extra tilt thus set up gives a deep digging action at the proposed V center and windrows the excavated material to form one side of the ditch.

Now place the track in the bottom of the cut and make a pass in the opposite direction. This shapes the second side of the V-ditch. To finish, clean up the loose material with a final pass. To widen and deepen, make additional passes.

Try this job-proved time and money-saving method with your LeTourneau Angledozer. Watch it make tractor power go further.

LeTourneau-"Caterpillar" Dealer Service Saves Tractor Power, Too

Your LeTourneau-"Caterpillar" dealer is completely equipped to rebuild tractors and engines and make repairs on all LeTourneau rigs. Well equipped machine shops and especially designed equipment and tools assure you better, faster repair work, thus less lost tractor time. Call him NOW. Ask him about Tournaweld R-W (Rollerweld) for repairing worn track rollers, rails, etc.

1. *Cutting first side of V-ditch. Note how material excavated by lower point of Angledozer blade rolls out under upper track, thus holds machine and blade to a constant cutting angle.*

2. *Cutting second side of V-ditch. Operator has turned around, leaves Angledozer blade tilted and angled, keeps tractor track in bottom of ditch.*

For Repair and Replacement Use TOURNAWELD and TOURNAROPE

Made by Men Who Best Know the Welding and Cable Needs of Earthmovers

R. G. LeTourneau began repairing construction equipment by welding as early as 1919. Soon was building his own contracting tools with welding rod and steel, has used that method of fabrication exclusively ever since. Not content with conventional rod, he began manufacturing Tournaweld (in 1940), developed especially for the specific steels and welding requirements of LeTourneau earthmoving equipment. Today Tournaweld is made in 7 different types and a variety of sizes to provide a right rod for every construction and repair need on LeTourneau equipment.

LeTourneau first built a cable-operated Scraper back in 1928. Since then more than 30,000 LeTourneau Power Control Units for the cable operation of earthmoving units have been built. Result: LeTourneau has a cable-operation experience unequalled in the tractor equipment field. From that experience we have developed Tournarope, a long-wearing, preformed wire rope, made in our own factory, expressly for earthmoving use. Standard for 2½ years on all new LeTourneau equipment. Available in 6 sizes — ⅜", ½", 9/16", ⅝", ¾" and ⅞" — for replacement use.

Both long-wearing Tournarope and specially-made Tournaweld are sold exclusively by LeTourneau-"Caterpillar" dealers, subject to WPB limitation. See your dealer for priority requirements NOW.

ARMY NAVY E

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PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TRACTOR CRANES.

*Name Reg. U. S. Pat. Off.

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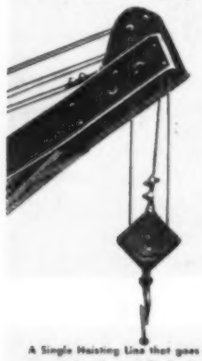
WHEEL-TRACTOR CRANES

Ask the Men Who Handle 'Em!

"We're pals — me and my Mercer Crane! Just show us the work...we'll clean it up in jig time. My No. 7's a real sweetheart — it's just about the smoothest tonnage tackler on wheels!"

Live Boom, Telescoping Gooseneck Boom Head with Boom Rollers.

Standard Live Boom equipped with double sheaves for main and topping hoist lines.



A Single Hoisting Line that goes over the top — designed especially for Stevedores.

"Mercer—that's MY Crane! It picks 'em up and puts 'em down just like it was no effort at all! You'll go a long way, Buddy, before you'll find a Mercer Crane that can't take it!"

3, 5 and 7 Ton Capacities!

Compact, fast, sturdy...they deliver hard, continuous service at low cost. Gasoline-powered . . . one-man operation. Single or double-drum hoists. Cushion rubber or pneumatic tires. Special booms and heads for every type of lifting, carrying and loading. Parts standardization means simple adjustment and servicing in the field. Our new Catalog No. 65 completely illustrates and describes the entire line. Write for your copy today.

To assist Mercer Crane Operators and help conserve equipment, we offer a group of "Maximum Load Finders" covering all models. These jumper-pocket size "rules", shown at the left, tell the operator at a glance exactly the maximum load he can safely carry at various distances in front of the bumper plate. These handy gadgets are yours for the asking!

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Materials Handling Equipment

30 CHURCH STREET, NEW YORK, N. Y.

WORKS: Clifton (Allwood), N. J.

ROOF VENTILATORS—**The Swartwout Co.**, 18511 Euclid Ave., Cleveland, Ohio. (8 pp., illustrated) Describes "NCM" line of roof ventilators made of non-critical materials. Various ventilator designs are patterned after original metal Swartwout ventilators and are for use in essential applications where metal is not vitally necessary.

★ ★ ★

WALL AND CEILING FIBER PANELS—**The Upson Co.**, Lockport, N. Y. (24-p. booklet) Describes and illustrates uses of Strong-Belt panels which are shipped to the job, numbered and pre-cut, and ready for immediate application to framing. May be applied in summer or winter, in hot weather or cold. Immediately upon application, walls are finished and ready for painting. Said to be thick, tough and rigid, capable of withstanding severe stresses and strains, and to have six times impact resistance of 3/8-in plaster board. In applying these panels cutting, taping or filling of joints is eliminated. There are no nails to countersink—no nail holes to fill. Entire wall of average size room can be covered with one panel in one operation, producing flat, unbroken, seamless surface. Other advantages set forth: low painting cost; efficient insulation value; uses in construction of prefabricated and demountable housing.

★ ★ ★

KNOW YOUR ROPES—**Wickwire Spencer Steel Co.**, 41 E. 42nd St., New York City. (81 pp., illustrated). Manual of wire rope selection, application and usage that tells how to make wire rope last longer. Gives precise directions for cutting and oiling; for selecting of most efficient size and location of sheaves; for proper winding on hoisting drum, and for attachment of wire rope sockets. Chapter on rope selection with advice on special ropes for special uses. Suggests how to avoid kinks. Gives uses of Langlay and Regular Lay rope. Other subjects treated: Positioning of saddle; alignment of sheaves; result of using too heavy a sheave; results of continued bending and unbending of wire; rope hardness; resistance to abrasion; length of lay determines elasticity; value of preforming rope; consequences of over- and under-loading; flexibility.

★ ★ ★

PRODUCTION DELAYS COST MONEY—**Invincible Tool Co.**, 914-16 Citizens Trust Co., Fort Wayne, Ind. (8 pp., illustrated) When a machine breaks down, not only are hours lost in repairing it, but also valuable production time is thrown away. Most of this loss is caused by having to dismantle almost entirely a machine which standard portable drill cannot reach. This folder describes an assortment of angle tool attachments which make portable drills universal for operation by converting them into angle tools in few minutes. These attachments reach the spot in drilling, reaming, tapping, nut running, counter boring, spot facing, counter sinking, screw driving, burring, grinding, keywaying, threading and vertical and angular milling. They are valuable in making all types of machine repairs; in assembling diesel engines, pumps, turbines and generators; in plant maintenance and millwrighting.

★ ★ ★

LOW PRESSURE SPRAY EQUIPMENT—**Eclipse Air Brush Co.**, 390 Park Ave., Newark, N. J. (32 pp., illustrated). Photographs and descriptions of various jobs on which this type of equipment is used, such as (1) Special spray equipment for testing application of color to airdrome runways; (2) barge painting; (3) structural steel painting; (4) painting ponton bridge parts; (5) painting ships.

GOOD LIVING

Comes *Only* from Industrial Progress

THE more we believe in the Four Freedoms, the greater our obligation to understand them, and to know exactly what we have to do to enjoy *all* of the advantages they imply.

Take Freedom from Want, for instance. Where will it come from? Will it be the gift of a government department? Can it be created by issuing orders and directives?

▶ Of course not. Executives and government departments get their powers as well as their money from Congress. Can Congress create Freedom from Want by law?

Not in the final analysis. Congress can only allocate the total energies of our nation by law. It can take all the good living there is and divide it up differently.

So, if you happen to live poorly and want to live better, it's to your interest to see that Congress does a very wise job when the time to divvy up arrives.

Congress can assume either that industry can't grow any more and try to solve the problem by dividing up existing jobs, or it can stimulate *more* good living, through wise laws that encourage Industrial progress and make more jobs.

▶ Multiplication will work a lot better than division, in this case.

If Congress will hold on to the fact that art, science, political experiments, luxuries AND necessities *all* must have their foundations in healthy industry, it will be more likely to pass only those laws which encourage industrial growth.

"Seed Money" an Example

When Congress, and the people, realize that business progress is the foundation of all improvement, our tax laws will stop confusing personal profit (salaries and dividends) with reinvested profit.

Profit held for reinvestment is the SEED MONEY of business. It is the money a business saves from current operations to insure future growth.

▶ Business will need billions of "Seed Money" dollars when the war is over. But, under the present tax law, industry cannot save as it should for that rainy day.

You hear lots of talk about the jobs that will result from the transparent automobiles and the sky-sedans that industry will build after the war, but not enough talk about the need for SEED MONEY to turn those hopes into realities.

The practical fact is that business cannot adjust itself to postwar production without "Seed Money."

"Seed Money" will pay for the research that must come before new and better postwar products can be built. It will pay for re-tooling when new models are produced. It will pay for the study of methods to get the lower costs that will make it possible for more people to buy. It will pay for setting up new distributors and dealers, and for hundreds of other activities that are involved in the growth of business.

The tax law should be adjusted to allow business to accumulate funds for these necessary tasks of postwar development.

▶ Ask your Congressman to see that American business is given a chance to create jobs after the war, by revising the excess profits tax so as to leave the "Seed Money" and by reviewing all laws with this principle in mind:

"Industrial Progress
is the Source of all Good Living."

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22 publications, which gather "war-news" from the "war-production-front" through a staff of 153 editors and 725 engineer-correspondents . . . More than 1,500,000 executives, designers, production men and distributors use the editorial and advertising pages of these magazines to exchange ideas on war-production problems.

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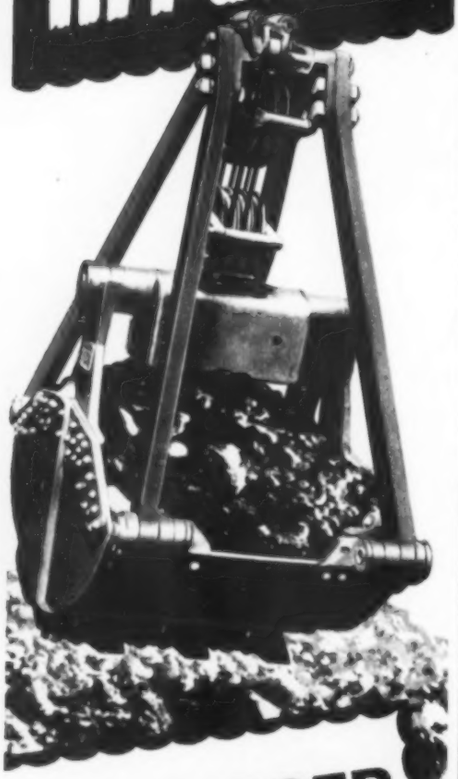

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Engineered all the way through to do the job. Backed by fifty years of specialized manufacturing skill and experience. The pay-off bucket for better, more efficient 1943 work.

Haiss Hi-Power has the brute strength for heavy digging, and the power in its bite to yank loose an embedded boulder. Weight and closing power combine to dig deep and tear out a heaping bowlful at every grab. Alloy steel parts for abrasion resistance, long bearings for longer wear.

★ *Bucket agencies throughout the country. Write, wire for prices, delivery and catalogs.*

GEORGE HAISS MANUFACTURING CO., INC.
139th St. & Canal Place, New York

EARTHMOVING ESTIMATOR—**R. G. LeTourneau, Inc.,** Peoria, Ill. New estimator in modified form may now be used in connection with all earthmoving units. Said to cover every angle of subject of earthmoving or hauling and costs and to eliminate necessity of remembering any constants, production figures or costs. Simple to operate and covers complex as well as average haul. One side is devoted to general units (tractors, trucks and Tournapulls or pneumatic-tired units) and hauls in which elements are based on long-period averages. Other side provides information on specific hauls in which elements such as rolling resistance, grade, weight, drawbar and speeds are set forth. Instruction sheet accompanying estimator gives full directions for effective use.

★ ★ ★

TRACTORS ON WAR JOBS—**Caterpillar Tractor Co.,** Peoria, Ill. (16 pp., illustrated) Booklet captioned "The Honor Roll" gives an account by word and picture of the record-breaking feats of earth-moving accomplished on many fronts by Caterpillar diesels in furtherance of the war effort. Photographs and descriptions cover work done at military airbases, at army camps and on vital supply lines the world over.

★ ★ ★

USES OF PLASTICIZED POLYVINYL RESINS—**B. F. Goodrich Co.,** Akron, Ohio. (22 pp. illustrated.) Koroseal, a synthetic elastic having many rubber-like qualities, has been made and sold for several years. To place the vast amount of data on the material and its applications in the hands of consumers, the company will publish a 3-part handbook of technical information on the subject. Section I, now available, tells about the nature and chemistry of Koroseal, gives its physical properties, as well as approved mixing and processing procedures, and describes plasticizers, stabilizers and pigments used in compounds. One can obtain better than a working knowledge of this substance from a study of this section. Section 2 will cover insulating and jacketing materials for the wire and cable industry. Section 3 will describe many laboratory tests which evaluate thermoplastic and thermosetting materials in general.

★ ★ ★

HOW TO USE AN ELECTRIC DRILL—**The Black & Decker Mfg. Co.,** Towson, Md. (16 pp., illustrated) Handbook designed to show new workers, especially in war industry plants, the correct methods of using portable electric drills and obtaining greatest efficiency and longest life from these tools. Covers such points as assembling of drill, switch control, drill chucks and bits, how to use drill and important points on user maintenance and care. Copy of this booklet may be obtained by asking for "The Drill Use Book."

★ ★ ★

KEEP AHEAD OF WINTER TROUBLES—**Hauck Manufacturing Co.,** 124-136 Tenth St., Brooklyn, N. Y. (16 pp., illustrated) Booklet describes thawers and heaters for use wherever snow and ice are troublesome and interfering with production. These units also are of value in providing temporary heat for army camps, warehouses and buildings, for use in military, naval and industrial construction work, for concrete heaters and central mixing plants. Superheated steam thawers are mainly of interest to municipalities, state and county highway departments, army and navy establishments, electric and gas utilities and fire departments.

"Down" time today, or any day, for greasing, maintenance or adjustment is non-productive time. But everyone knows a certain amount of it is necessary.

For this reason Byers engineers designed a crane or shovel that reduces non-productive time to the minimum by making it a simple, handy, easy task for operator or oiler to keep his Byers ship-shape and working more minutes of every shift.

Operators all over the world confirm the judgment of Byers Engineers.

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CRANES and SHOVELS
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THE GORMAN-RUPP DISTRIBUTOR WILL restore YOUR EQUIPMENT

As more materials are diverted to essential war uses, new equipment becomes more difficult to get. Greater care must be given present equipment until after Victory. Let your Gorman-Rupp distributor restore your equipment to its original operating efficiency. They carry parts and repairs for all equipment they sell. Their charges will be reasonable.

Gorman-Rupp Self-Priming Centrifugal Pumps are available for immediate delivery through Gorman-Rupp Distributors.

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Awarded to the Detroit and Muskegon Plants of Continental Motors Corporation for High Achievement.

THE mighty power of dependable Continental Red Seal Engines is serving our fighters on land, sea, and in the air. It is also serving for industry, in the oil fields, and on our farms — serving to keep alight the inspiration and unconquerable "Power to Win" of American Liberty.

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Boost Production ... Keep America Strong

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Automatic
DRAGLINE BUCKETS

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WATER PRODUCTION FOR INDUSTRIAL AND MUNICIPAL USE—**Ranney Water Collector Corp. of New York.** Heyburn Bldg., Louisville, Ky. (24 pp., illustrated) In addition to dealing with general problem of industrial and municipal water supply, booklet sets forth in detail advantages of Ranney System and includes complete engineering sketches and photographs.

★ ★ ★

TANDEM PORTABLE CRUSHING PLANT FOR GRAVEL & ROCK—**Iowa Manufacturing Co.,** Cedar Rapids, Iowa. (8-p. bulletin, illustrated) Features in description and picture Cedarapids Master Tandem, a complete gravel plant that will team up with added units to serve many purposes. By putting ahead of this unit a primary crusher, the assembly makes a modern quarry plant. A complete multi-sizing gravel or stone crushing plant may be put into operation by the addition of a multi-bin unit with a sizing screen. By the addition of sprays, washing screws and settling tank a complete crushing, screening and washing plant is available.

★ ★ ★

RUBBER CONSERVATION—**Pioneer Rubber Mills,** 353 Sacramento St., San Francisco, Calif. (21-p. booklet in color, illustrated) "How to Lengthen the Life of Mechanical Rubber Goods" is the title of this booklet which contains illustrations and explanations of ways to increase service of rubber belting and hose and suggests marking of industrial rubber in daily use within plant with attractively designed tags (free supply upon request) reminding workers to handle with care and to conserve.

★ ★ ★

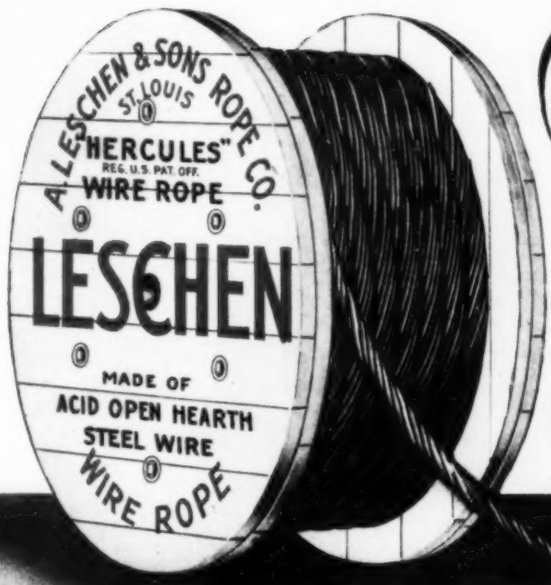
THE FOREST FIGHTS—**Timber Engineering Co.,** Washington, D. C. (48 pp., illustrated). Book of about 200 news pictures showing jobs forest industries have done and are doing to forward nation's war effort. Action shots "at the front," through the supply line and training camps, to industry and war housing on the home front. In all, the photographs wood is shown in some war use, major or minor. Other illustrations show uncommon or revised uses of wood, improved engineering methods in timber, research that is developing broader uses for wood and equipment and methods that are protecting forests against fire.

★ ★ ★

PRINTING MACHINE—**Peck & Harvey,** 4327 Addison St., Chicago, Ill. (6-p. folder, illustrated). Describes Spee-Dee printer for use in making blue and black and white prints. Supplied in two sizes with capacities for prints up to 12x18 and 18x24 in. Gives directions for making perfect prints. Lists prices.

★ ★ ★

EMERGENCY FIX-IT HANDBOOK—**The Thew Shovel Co.,** Lorain, Ohio. (24-p. booklet illustrated) Methods of keeping Lorain machines are described in this booklet with special emphasis on best way to meet emergencies in the field and on use of substitutes for critically hard-to-obtain materials. Tells how to reshape tread pin holes, how to build up tread teeth and what materials to use as substitute for replacement bushings. While many of the suggestions are given as temporary expedients only, they are offered to help keep machines on job, to conserve worn parts and to save owners both time and money.



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A Time and Material Saving Combination

There are three definite and outstanding factors that enable Preformed Flattened Strand "HERCULES" (Red-Strand) Wire Rope to help you speed up production and at the same time conserve needed raw material.

1. **As it is Preformed it is easier and quicker to handle . . . it spools more smoothly and evenly . . . it offers greater resistance to fatigue.**
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3. **Being of the "HERCULES" grade, it is "tops" in quality and advanced manufacturing methods.**

Why not utilize the advantages of this wire rope? Its longer life will not only save time and materials—but money as well.

"HERCULES" (Red-Strand) Wire Rope is also made in all of the Standard Round Strand Constructions—both Preformed and Non-Preformed. A "misfit" rope, either in type, construction or quality, will definitely reduce efficiency. Our experienced Engineering Department will be glad to help you overcome this handicap.

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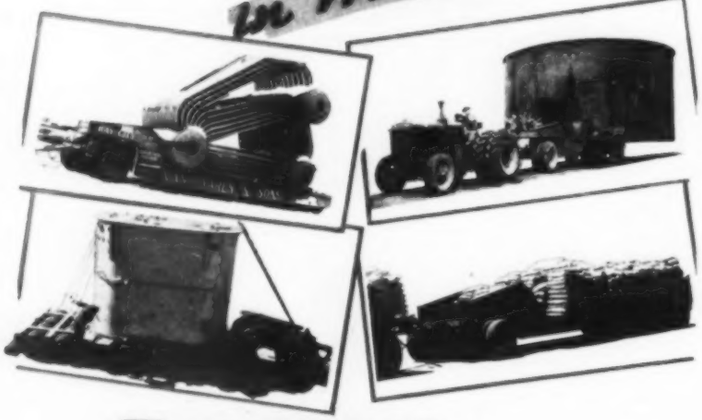

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You gain speed through the easy handling, strong leverage and straight-line application of power on LOWELL REVERSIBLE RATCHET WRENCHES.

The improved new types of LOWELL WRENCHES are the result of more than 70 years experience and development – 1869 to 1942. They are made in a wide range of types and sizes for all classes of heavy construction, erection and maintenance.

Have patience with your dealer if he is unable to furnish all of the numerous LOWELL types and sizes, for we are engaged, for the duration, in supplying the needs of our Armed Forces.

See how each pawl, when engaged, transmits leverage from the solid stock of the handle, direct to the gear, in a straight line and with a square contact. The pawl is in COMPRESSION ONLY – no shear, no tension, no torsion. The shipper carries NONE of the load. This strong construction insures steady service.

LOWELL WRENCH CO.
1869 WORCESTER, MASS., U.S.A. 1943

STEEL IN THE MAKING—**Bethlehem Steel Co.**, Bethlehem, Pa. (72 pp., illustrated.) A brief, non-technical treatise describing the fundamentals of steelmaking. Covers various kinds of steel, from carbon grades to alloy steels, and raw materials needed. Sections deal with bessemer, open-hearth and electric furnace processes. Other subjects include rolling mill operations, rod and wire products, tubular products and cold-drawn bars. Terms used in the steel industry are defined.

★ ★ ★

LIGHTWEIGHT CONCRETE AGGREGATE—**Waylite Co.**, 105 West Madison St., Chicago, Ill. (8 pp., tables) Describes properties of Waylite, a lightweight, cellular slag processed, refined and expanded while molten by agitating as it comes from blast furnace. Cells formed by expanding gases in material enhance its insulating qualities and reduce dead load. Aggregate is graded in two sizes, fine and coarse, for use in making lightweight concrete precast floors, roof slabs and building blocks. Coarse aggregate weighs 38 lb. and fine aggregate 60 lb. per cu.ft., dry loose measure. Waylight concrete weighs from 60 to 100 lb. per cu.ft., or from 30 to 40 percent lighter than ordinary concrete. Design data for various light aggregate concrete mixes are presented in a series of tables. Sections of the booklet are devoted to building blocks and wall insulation.

★ ★ ★

RESERVOIR ROOFS—**The California Redwood Assoc.**, 405 Montgomery St., San Francisco, Calif. (4-p. folder) Featuring double-page spread of sketches and various construction details of the Walpert St. reservoir, Hayward, Calif., bulletin stresses fact that California Redwood combines physical and mechanical properties essential to good reservoir construction. Sizes and grades of timber framing are reviewed and correct type of fastenings recommended. Full page of photos showing framework and roof construction for both round and square reservoirs.

★ ★ ★

FIRST AID FOR CHAIN DRIVES—**Link-Belt Co.**, 307 N. Michigan Ave., Chicago, Ill. (Folder No. 1951). Tells what can be done to keep chain drives running when repairs or replacements are impossible or difficult to obtain, what to do for worn chain and for worn wheels and shows how to get new life from old chain pins. Seven servicing suggestions are given to make chain drives run better and last longer.

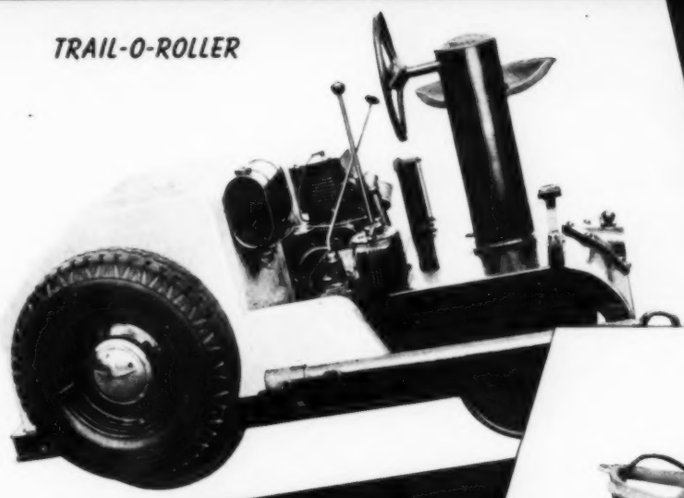
★ ★ ★

HYDRAULIC DREDGES AND DREDGING EQUIPMENT—**Morris Machine Works**, Baldwinsville, N. Y. (24 pp. illustrated). Bulletin 177 includes sectional views and exteriors of various types of dredges, illustrations of these machines at work on numerous operations, such as sand and gravel production, reservoir deepening and enlargement, waterways improvement and shore line development. Complete descriptions of many types of centrifugal pumps and accessories.

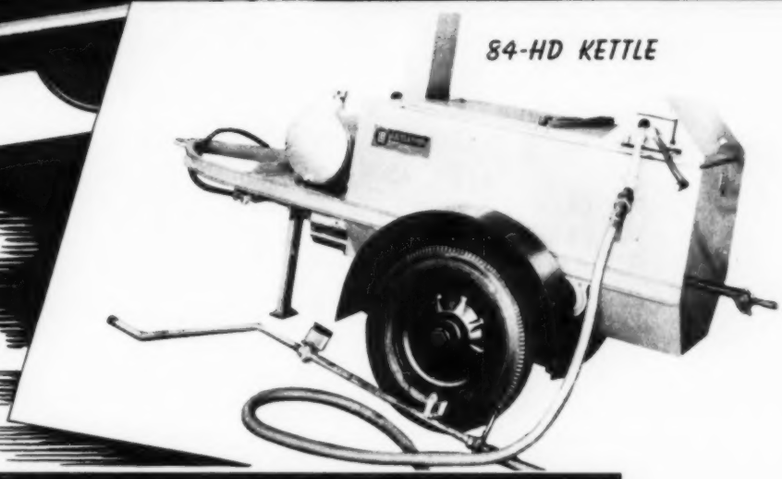
★ ★ ★

MORE WORK WITH EACH ELECTRODE—**Air Reduction Sales Co.**, New York, N. Y. (6 wall displays, illustrated.) In order to bring to the attention of the actual user of electrodes in gas welding the extent of the waste usual in his work, Airco engineers have gathered data on this habit and the company has issued a series of shop posters which should prove an important help in stimulating the operator to eliminate waste wherever possible.

TRAIL-O-ROLLER



84-HD KETTLE

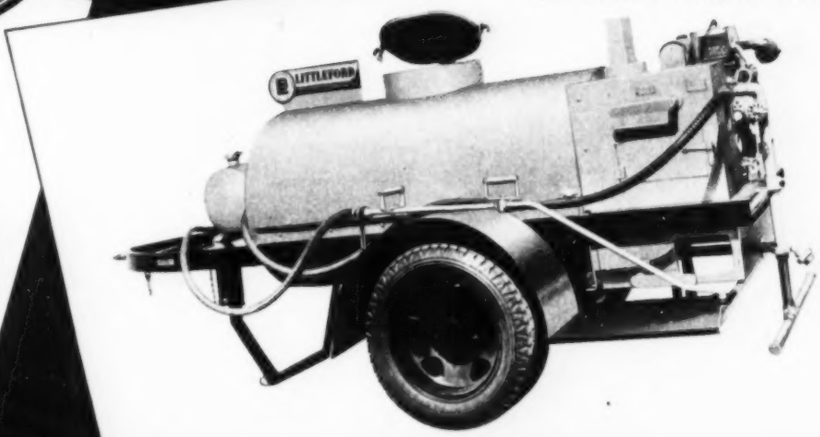


BLACK TOP ROAD MAINTENANCE EQUIPMENT

LB LITTLEFORD

SINCE - 1900

101 UTILITY SPRAY TANK



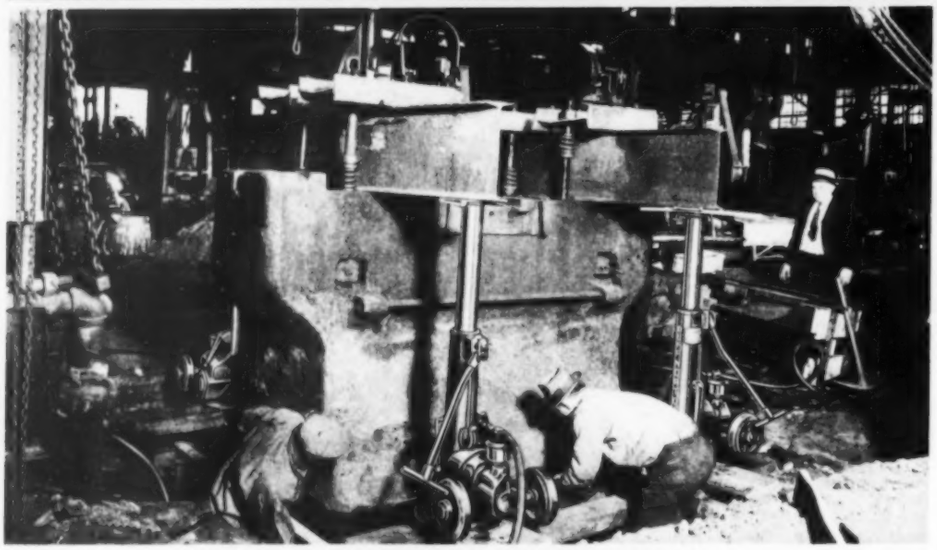
TORCH TYPE
OIL BURNER

BLACK TOP ROAD MAINTENANCE EQUIPMENT

The Littleford Trade Mark is in the fight, building and maintaining Airports, Highways, Roads, Barracks and Cantonments. Doing a job to help bring an early peace. After Victory, the Littleford "Trade Mark" will again help to make this world a better place in which to live. Littleford, since 1900, has produced Black Top Construction and Maintenance Equipment, and is NOW proud to have the chance to produce for Victory.

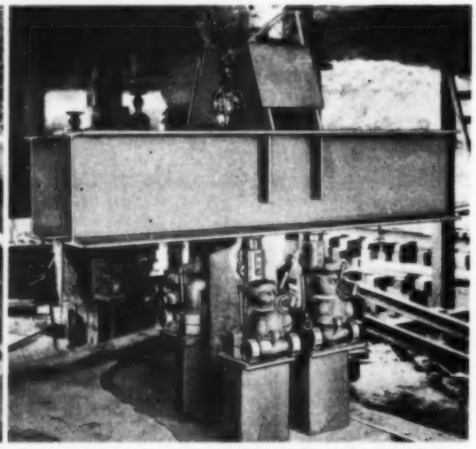
LITTLEFORD BROS., INC., 465 E. Pearl St., CINCINNATI, OHIO

Save Time and Manpower WITH DUFF-NORTON JACKS

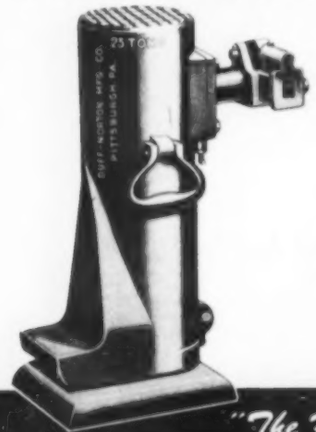


Duff-Norton Rotary Air Motor Jacks at work setting heavy machines in place.

Duff-Norton Trench Braces helping in vital construction



Speeding building expansion—Duff Norton Crank Lowering Jacks



Today, any means of multiplying manpower is an important contribution to the war effort. With Duff-Norton Jacks, fewer men can do many jobs faster!

These sturdy, dependable, easy-to-operate jacks help your men speed their work by providing efficient mechanical muscles for every job of lifting, lowering, pushing and pulling. Make fullest use of Duff-Norton Jacks to multiply your manpower.

Write for Catalog 201 describing the complete line.

"The House that Jacks Built"

THE DUFF-NORTON MANUFACTURING COMPANY

PITTSBURGH, PENNSYLVANIA

Canadian Plant:
COATICOOK, QUEBEC

Representatives
in Principal Cities

CONVEYOR BELT REPAIRS — **Robins Conveying Belt Co.,** Passaic, N. J. (Leaflet bulletin. Shop card.) A new synthetic material, Malacca plastic rubber, is described on the leaflet, and full directions are given for its use in repairing and maintaining rubber-faced conveyor belts. By its use, it is claimed that exposed metal plates of chutes, hoppers, spreading table and the like also can be given a protective coating; cable insulation, which has been exposed to damage, can be repaired; head pulleys of conveyor systems can be given added traction; and emergency repairs to all types of mechanical rubber goods can be effected. The shop card carries often needed warnings to men working on or about conveyor belt systems, thus aiding in rubber conservation.

★ ★ ★

TOUGH STEEL FOR WEAR — **American Manganese Steel Division of the American Brake Shoe and Foundry Co., Chicago Heights, Ill.** (16 pp. illustrated.) One of the best ways of conserving our metal reserves is to have your machine parts that are subject to hard service made from a wear resisting alloy, such as Amsco manganese steel. Particularly should this be done on all elevating and conveying equipment where the attrition caused by cutting dusts or hard material is particularly severe. Use of manganese at the present time, however, requires a priority order.

★ ★ ★

EARTH MOVING, LAND CLEARING, SNOW REMOVAL EQUIPMENT—**La Plant-Choate Mfg. Co., Inc.,** Cedar Rapids, Iowa. (16 pp., two colors, illustrated). Describes and illustrates machines used for foregoing construction and maintenance operations in connection with Caterpillar tractors only, with specifications as to size and capacity. Sections are devoted to cable-operated scrapers ranging in size from 12 to 33 cu.yd.; to hydraulically operated scrapers of 3.8 to 8.2 yd. and new CW-10 "Carrimor" 10-cu.yd. scrapers. Trailbuilders, bulldozers, tampers, rippers and other tools are also included.

★ ★ ★

STEAM HOSE—**The B. F. Goodrich Co.,** Akron, Ohio. Revised 2-page catalog section contains rules for care and maintenance of this product, as well as detailed instructions on proper methods of attaching couplings. Data on inside and outside diameters, weight and number of plies also are listed.

★ ★ ★

SHOVEL-DRAGLINE-CRANE — **Link-Belt Speeder Corp.,** 301 W. Pershing Road, Chicago, Ill. (12 pp., illustrated) Describes and illustrates 1¼-yd., heavy-duty model LS-120 crawler shovel, dragline, crane, including following features: All-welded unit construction instead of castings; self-aligning center-pin bearing and rotating rollers and independent, rapid boom-hoist. Of particular interest is pull shovel with front-end attachment of completely new design, permitting deeper and more positive digging. Construction details and installation views. General dimensions, clearances, lifting capacities and specifications.

★ ★ ★

VERTICAL CENTRIFUGAL PUMP — **Economy Pumps Inc.,** Hamilton, Ohio. (8 pp., illustrated) Describes and illustrates new electric motor-driven unit for clear liquid service, available in capacities from 10 to 500 gpm. Lists various uses of pump, such as for hot and cold water and brine circulation, air conditioning and sprinkler systems. Details various advantages accruing from use of these units: (1) Take up less room than horizontal pumps; (2) ease of maintenance; (3) simplified lubrication. A 256-page engineering handbook containing data of use on solution of pump problems is available upon request.

You Bet-I'm Busy!

but not too busy to keep my equipment in A-1 shape!

With new machines and replacement parts hard to get, it's practical patriotism, as well as good business, to adopt a regular schedule of inspection, lubrication and maintenance of your present equipment . . . . . Keep your MICHIGAN Mobile CRANES in shape to carry on under war-time pressure.

CHECK THESE VITAL POINTS REGULARLY:

- **Power Take-Off:** Inspect housing weekly for proper oil level. Use SAE No. 250 in summer; SAE No. 140 in winter.
- **Hoist, Crowd, Intermediate and Swing Shafts:** Remove and repack bearing retainers every six months. When machine is worked longer than normal hours, repack retainers more frequently.
- **Boom Point Sheave Bushings:** Grease daily through high-pressure fittings. Inspect sheave flanges for wear. Sheaves in good condition will contribute to longer cable life.
- **Cables:** Inspect regularly for wear. Apply lubricant by brush as required.
- **Main Drive Chain:** To eliminate chain slap, add shims under hoist shaft support brackets.
- **Clutches (Hoist, Crowd, Swing):** To adjust, remove cotter keys and tighten the three nuts located on extreme diameters of clutches to an even, snug pressure. Back nuts off five notches and replace cotter keys.

Our engineering staff is ready to offer its services in helping you solve your lubrication and maintenance problems. Write today . . . Ask for Bulletin CM53

Model T6-K Michigan Mobile Shovel-Crane, ⅜ yard capacity. Convertible to standard front-end attachments.

AIR CONTROLLED

MICHIGAN

POWER SHOVEL CO.

BENTON HARBOR, MICHIGAN

THESE BIG HOISTS CARRY THE FULL RATED LOAD ON TWO DRUMS SIMULTANEOUSLY

AMERICAN

CONTRACTING BAND FRICTION HOISTS

are designed and built to carry the full rated load on two drums at the same time. The Model 250 AMERICAN Air Controlled Steam Hoist shown above is doing just that; erecting a 50,000 pound pressure vessel at a large refinery.

ASK FOR CATALOG *No. 100-H-3A and get the whole story on these great hoists.*

SIXTY YEARS OF SAFETY 1883 1943 The Genuine CROSBY CLIP

AMERICAN HOIST & DERRICK CO.

SAINT PAUL, MINNESOTA

AMERICAN TERRY DERRICK CO. . . . . South Kearny, N. J.

LUBRICATION OF BALL AND ROLLER BEARINGS—**SKF Industries, Inc.,** Front St. & Erie Ave., Philadelphia, Pa. (28 pp., illustrated) Presents information derived from extensive experience as it relates to practical problem of correct ball and roller bearing lubrication. Designs illustrate various successful arrangements for either oil or grease lubrication and description of the principles involved is given. Subjects treated: Functions of lubrication, oil lubrication, grease lubrication, comparative advantages of oil and grease; high temperature applications; minimum friction application; protection against moisture; protection of idle machinery; cleaning.

★ ★ ★

ARC WELDING—**Westinghouse Electric & Manufacturing Co.,** East Pittsburgh, Pa. (12-p. booklet) Describes Flexarc ac. welders, use of which are claimed to increase speed 20 to 30 percent and cut power costs one-third. Compares advantages of ac. and dc. welding, claiming that the former increases output because of absence of magnetic arc blow, ease in using heavy electrodes with higher currents and ability to make good welds in all positions. Complete line of Flexarc welders with current ratings from 100 to 500 amp. is described. Featured are the 500-amp. industrial welder for high speed, continuous welding on all types of heavy construction and 300-amp. portable welder for heavy-duty work. Both models have built-in power-factor correction.

★ ★ ★

ROLLING DOORS—**Cornell Iron Works, Inc.,** 36th Ave. at 13th St., Long Island City, N. Y. (8 pp., illustrated) Describes and illustrates line of rolling and sliding grilles, rigid and folding upward acting doors in wood and steel. Although the manufacture of steel doors has been limited, wood rolling doors, wood vertical-lift and wood canopy doors illustrated and described are recommended to conserve critical material.

★ ★ ★

Broken Stud Bolts Removed by New *Arc-Welding Technique*

BY THE APPLICATION OF ELECTRIC WELDING the problem of removing broken stud bolts, often encountered by mechanics and machinists, has been solved by two New York welders, William F. Kramer and Alex F. Morton. Their method, as reported by the Lincoln Electric Co., is claimed to be twenty times as fast as the conventional procedure of drilling out the broken bolts.

The new technique involves the use of arc welding. When a series of stud bolts are sheared off in a casting, as illus-

(Continued from page 60)

ROBINS

CONVEYING BELT COMPANY

changes its name!

. . . adopting a new one more truly descriptive of the scope, utility and applications of its products and services. This move does not involve any change in directorship, management, or corporate structure.

FOR MATERIAL AID *in* MATERIALS HANDLING

It's ROBINS

Engineers • Manufacturers • Erectors

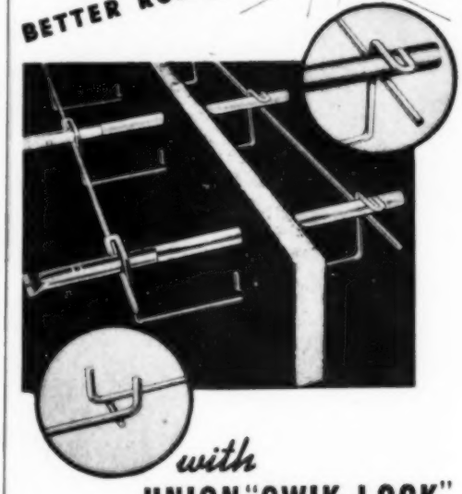
ROBINS CONVEYORS INCORPORATED

Passaic, New Jersey

of Materials Handling Machinery

Takes Less Time

TO BUILD BETTER RUNWAYS



with UNION "QWIK-LOCK"

Union "Qwik-Lock" Airplane Runway Expansion Joint Assemblies speed up construction. They simplify installation of dowels and joint material and accurate, locking and alignment of dowels. They are designed for fool-proof, trouble-free functioning.

Write for Catalog of Construction Accessories.

UNION STEEL PRODUCTS COMPANY

439 Pine Street Albion, Michigan

SEE OUR CATALOG IN SWEET'S

MORETRENCH WELLPOINTS ON HOUSING PROJECT SEWER

• Eliminate Sheeting

• Speed Progress

• Lower Costs

Construction of 2,000' of gravity sewer in fine sand with water practically at the surface offered no problem to this contractor. He knew from past experience that a MORETRENCH WELLPOINT SYSTEM would enable him to work "in the dry" and save both time and money.

Moretrench Wellpoints can make a tremendous difference in the progress—and profit—of your wet work. Why not take advantage of this fact? We rent, sell, and contract. Send for an estimate today.

MORETRENCH CORPORATION

90 WEST STREET, NEW YORK

ROCKAWAY, NEW JERSEY CHICAGO, ILLINOIS NEW ORLEANS, LOUISIANA

RITECURE

The Original Membraneous Concrete Curing Material

Its Uniformity Assures Consistently Good Curing

THE shipment of RITECURE to one of the West Indies last winter did not differ the slightest bit—except in gallonage—from another shipment recently tagged for Kentucky. Nor do successive shipments to a single large job.

RITECURE is uniform!

Rigid adherence to high quality and uniformity in the ingredients . . . close laboratory control during production . . . careful manufacture in modern, instrument controlled equipment . . . these account, in part, for the consistent uniformity of RITECURE.

When you specify or use RITECURE for concrete construction, you can count on each gallon doing the same high quality work. You can count on getting from 30 to 40 square yards effectively cured for each gallon. You can count on high moisture retention over every yard throughout the critical curing period.

One of the factors contributing to the greater effectiveness of RITECURE as a membraneous curing material is its exceptionally high percentage of solids.

RITECURE

A Transparent Membrane for Curing Concrete

IS SOLD BY:

THOMPSON MATERIALS CORP.
204 WEST STREET, NEW YORK, N. Y.

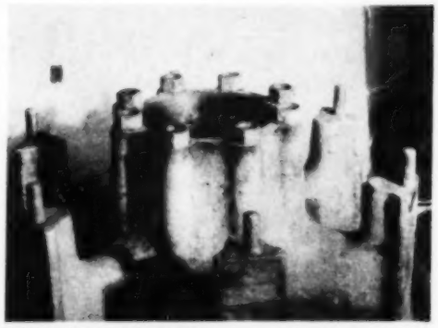
CURING MATERIALS CO.
2130 JANE STREET, PITTSBURGH, PA.

a product of: **The Johnson-March Corporation, 52 Vanderbilt Avenue, New York, N. Y.**

R-JM-8

(Continued from page 118)

trated, the welders place nuts in position above the broken studs and center them. In each case the inside diameter of the nut is slightly larger than the outside diameter of the broken stud. By means of the electric arc the studs then are built up to the nuts by applying several layers of weld metal. Next the nuts are welded to the studs and a wrench is applied to unscrew the broken bolts.



NUTS ARE CENTERED over eight broken stud bolts in casting and then are turned with wrench to unscrew and remove broken parts.

Where a number of studs have been broken, Morton and Kramer advise welding them all before removing any. This permits the heat from the arc to accumulate in the casting, expanding it and in most cases making removal of the studs as easy as the removal of an ordinary nut from a bolt by means of a wrench. The welders found that they were able to remove some 20 broken stud bolts per hour by this method.

The previous method, which involved drilling out the inside of the stud bolt and then breaking out the thin shell remaining with a small tool before rethreading, took a good machinist on the average of one hour for each bolt, according to observations made by Kramer and Morton. In cases where the hardened stud was broken off on an angle, even more difficulty was experienced by the old method for the drills "run" and often break because of the slant of the surface.

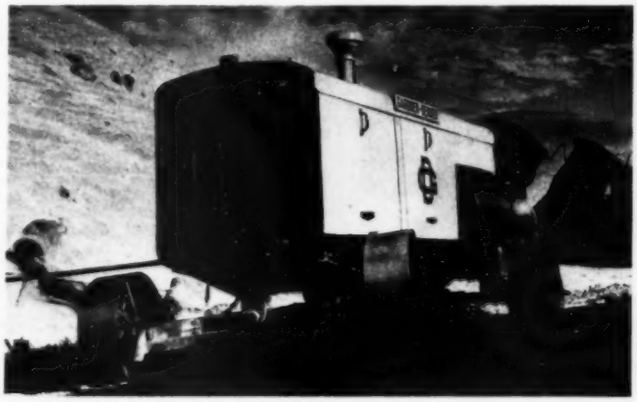
BROKEN STUD BOLTS like these can be removed at rate of twenty per hour by welding nuts to them and applying wrench.

Even when a large stud bolt is "frozen" into a casting the welding technique can be used in most cases. An example of this is shown at the left of the row of bolts pictured. This large

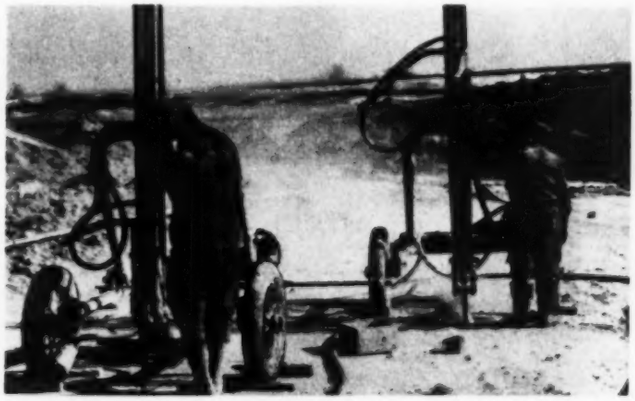
(Continued on page 122)

Keeping on Top of Wartime Jobs

IT's no coincidence that where Gardner-Denver equipment is at work, the job so often moves more quickly—more surely. This page tells why Gardner-Denver equipment helps engineers and contractors keep on top of wartime jobs. For further information, write Gardner-Denver Company, Quincy, Illinois.

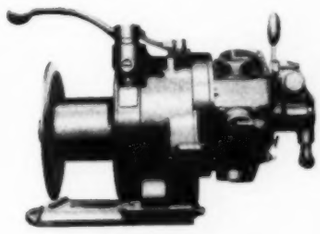


Fully water-cooled for dependable performance under all conditions—Gardner-Denver Portable Air Compressors are available in capacities from 85 to 365 cubic feet displacement per minute.

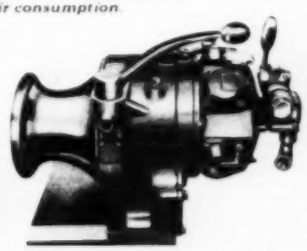


Maneuverability for accurate spotting of holes—Gardner-Denver UM-99 Universal Mounting Wagon Drills are equipped for 6-foot steel changes—are adjustable for drilling in any desired position.

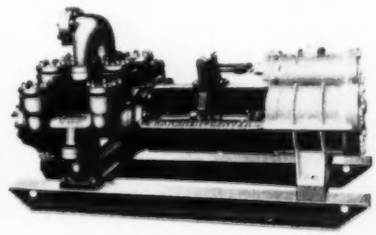
Perfectly balanced for faster footage—the Gardner-Denver S-55 Sinker is famous for its speed and low maintenance. Precision built for easy-riding and low air consumption.



Powered by the famous Gardner-Denver five-cylinder radial air motor, the Gardner-Denver Model HB Single Drum Air Hoist is a light, compact hoist which develops a 1250 pound rope pull at 62 feet per minute.



Convenient for a wide variety of uses, the Gardner-Denver HBW Winch Head Air Hoist is powered by the same motor used in the Model HB Hoist.

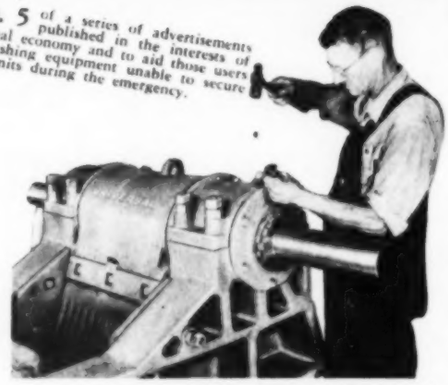


Equipped with "slush-proof" liners and valves, the Gardner-Denver 10x3½x10 Grout Pump is outstanding for heavy-duty, high pressure grouting.

GARDNER-DENVER *Since 1859*

The Care and Maintenance of Rock Crushers

No. 5 of a series of advertisements published in the interests of national economy and to aid those users of crushing equipment unable to secure new units during the emergency.



Ten Time and Money-Saving Maintenance Rules:

1. Be sure there is no play in side bearings. Tighten locking nuts with a blunt chisel and hammer, as illustrated.

2. Before shutting off power, be sure that machinery is cleaned of all stone or gravel.

3. Keep your equipment clean and free of dirt and excess grease.

4. Tighten all loose nuts and bolts every morning or every night, and check them periodically during the day. Make a thorough check after moving to a new location. Loose parts cause rapid wear or serious breakage and costly delays.

5. Crusher and chassis should always be kept level.

6. The key wedge should be kept close to the jaw. Insert shims behind wedge if necessary. Check wedge daily to be sure that it is tight; and that movable jaw remains centered.

7. Always adjust movable jaws when crusher is running empty, until they touch lightly. Then back them off slightly for clearance. Never allow them to pound. Tension spring should be just loose enough to allow free operation.

8. Don't raise or lower the adjusting wedge enough to cause a tilting in the toggle plate bearing wedge. Use a longer or shorter toggle to get the desired opening at the discharge opening of the jaws.

9. Be sure toggle seat on pitman is tight.

10. Be sure to use genuine parts—and see that they are properly installed. Follow instruction sheets or consult manufacturer.

UNIVERSAL ENGINEERING CORP. *(formerly Universal Crusher Co.)*
327 8th ST. WEST CEDAR RAPIDS, IOWA

UNIVERSAL
CRUSHERS. PULVERIZERS. COMPLETE PLANTS. SPREADEROLLERS. PORTABLE ASPHALT PLANTS

YOU DON'T NEED A CARSCOOP IF

You Have Plenty of Time And Enough Men

But not many of us have either these days. So call on the Butler Carscoop to solve your handling problems — it specializes in jobs that "can't be done." Designed for unloading bulk materials from boxcars, this machine will handle bulk cement or brass bars, dried clay or lead concentrates, with equal ease. With its 6½ foot turning radius, the Carscoop maneuvers easily within the narrow confines of a boxcar, unloading 300 bbls. of bulk cement in an hour and a quarter. Write for full information on this time and labor saving machine.

BUTLER BIN COMPANY • WAUKESHA WISCONSIN

(Continued from page 120)

stud bolt, which is 1 3/16 in. in diameter, was broken off 5/16 in. below the surface of a tractor bracket. After the head was welded on, Kramer and Morton heated the casting to a full red and removed the frozen stud with a 30-in. Stillson wrench. "The elimination of broken drills and the releasing of machinists from this time-consuming job to other work, results in a greater output all around," Kramer said.

★ ★ ★

Electric Eye Controls Vehicular Traffic

(Continued from page 71)

other end for 3 min.

(5) Prohibit all vehicles from entering either end of tunnel until it is clear of traffic.

(6) Begin with (1) and repeat.

If the tunnel is not cleared of traffic within 5 min. after the last vehicle was allowed to enter, an alarm is sounded and all traffic is prohibited from entering the tunnel until it is clear.

If the carbon monoxide content of the air in the tunnel rises above a predetermined value, all traffic is prohibited from entering the tunnel and the ventilating fan starts and continues to run until the carbon monoxide content falls to a predetermined minimum, at which time the fan stops and traffic is again allowed to flow.

All control is fully automatic and is basically done by electronic tubes.

Electric Eyes Count Vehicles

The watchmen of the tunnel are electronic relays ("electric eyes") which count the vehicles as they go into the tunnel and again as they go out of the tunnel. When the same number of vehicles have left the tunnel as have entered it during any one cycle, it is known that the tunnel is clear. If the outgoing count is one less than the ingoing count, it is evident that a lost sheep remains in the tunnel. Practice has shown it may be a boy and his girl friend, or more often a car out of gasoline or having motor trouble.

A patrolman stays within hearing of the alarm bell and when it rings he rides through the tunnel to scare out the laggard. He then resets the equipment to allow it again to take

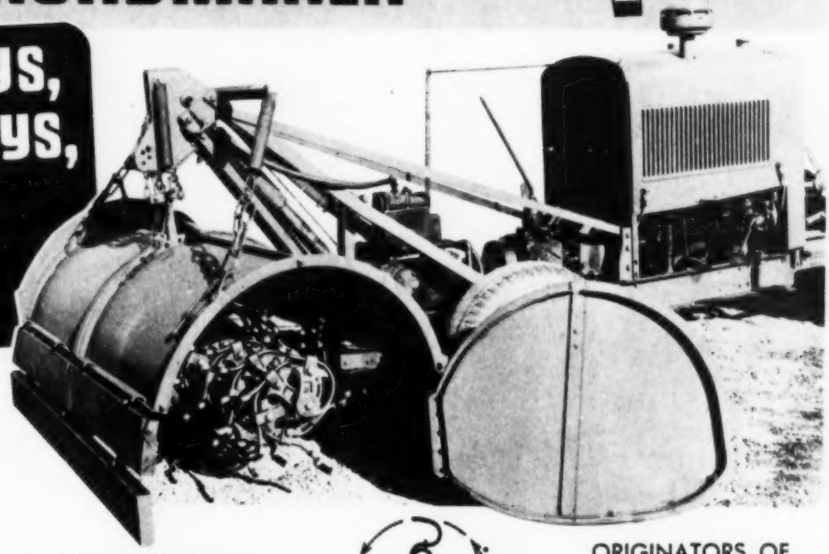
(Continued on page 124)

ROTOTILLER

TRADE MARK REG. U.S. PAT. OFF.

ROADMAKER

Builds HIGHWAYS, AIRPORT RUNWAYS, LANDING STRIPS faster, better, more economically.



WET or DRY, the 4 speed "3-in-1 Rotary Action" gives a BETTER, MORE UNIFORM PULVERIZED MIX

These are days of fast construction schedules and labor shortages. Roadway contractors and airport construction engineers want road-building machines that give superior performance. In the early days of soil-cement construction, back in '37, the FIRST soil-cement areas and roads constructed were made with ROTOTILLER. One of the first airport runways constructed with this revolutionary "3-in-1 rotary action" machine was praised by pilots as "the smoothest runway we ever came in on". It is noteworthy that these and similar pioneer soil-cement jobs were built with early ROTOTILLER models; 1943 models are even better and incorporate practical improvements suggested by contractors themselves.

Today, more and more soil-cement and stabilzation work on highways, landing strips, airport runways, and landing fields is being done. ROTOTILLER Roadmaker with its patented, perfected "3-in-1 rotary action" assures more accurate control in wet and dry mixing, as well as more thorough pulverization of materials. The scientific, spring-tine rotary action thoroughly mills the earth from top to bottom, resulting in complete pulverization and mixture to any depth up to 10 inches. You get all this in ONE operation—a better job at lower unit cost and with substantial savings in time and labor. Weighs, ready for work, only 3020 pounds—rugged, dependable.

See ROTOTILLER Roadmaker in action and you'll see why road and airport contractors consistently prefer this superior roadbuilder.

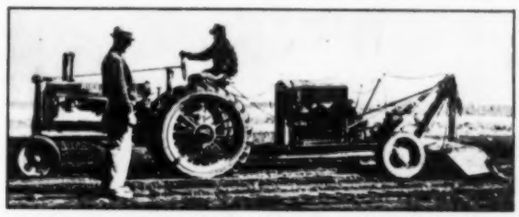
AND, AFTER THE WAR . . . *Post war reconstruction plans undoubtedly will include the building of thousands of miles of soil-cement and oil stabilized secondary roads. This work will be fostered as a means of giving employment to returning soldiers. Then, as now, ROTOTILLER Roadmakers will be on the job.*

Send for Illustrated folder and Technical data.

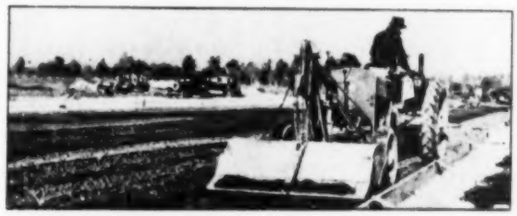
ROTOTILLER, inc. TROY, New York Dept. M

ORIGINATORS OF "3-in-1 ROTARY ACTION" TINES

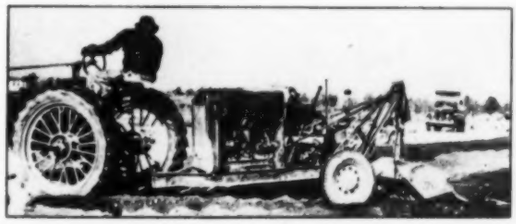
Only ROTOTILLER *gives you this 4 speed "3-in-1" mixing and scarifying combination.*



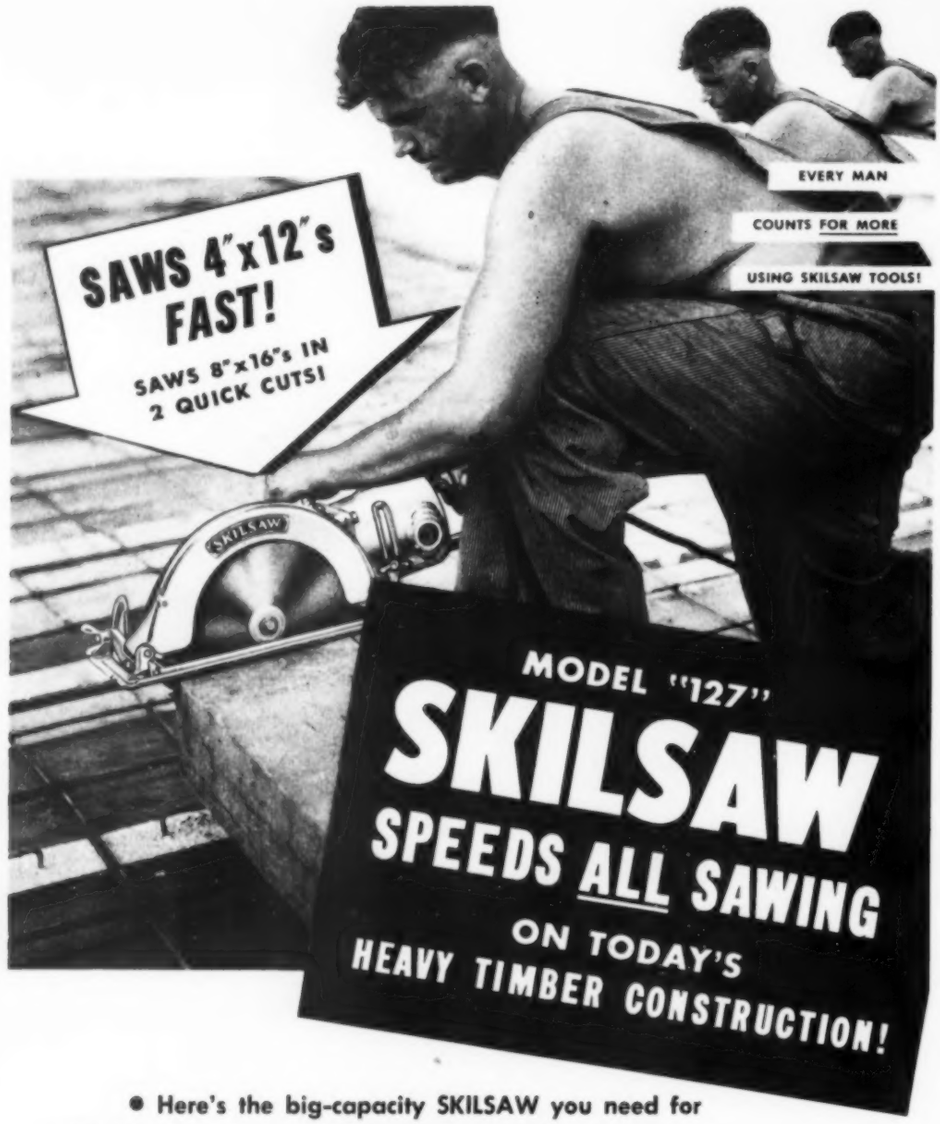
Early model ROTOTILLER building one of the first military airports to use soil-cement. After two hard winters, runways are reported still in first class condition.



With ROTOTILLER Roadmaker mixing can be done close to forms as shown in this illustration. ROTOTILLER can be used with almost any type tractor.

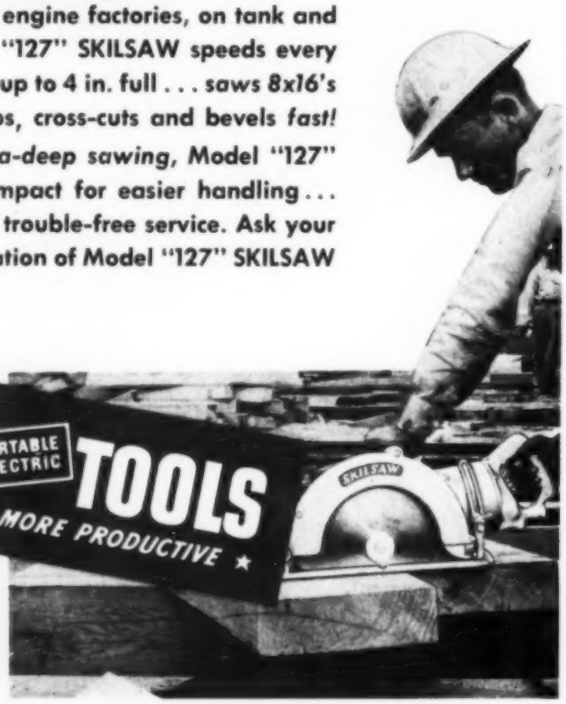


On the job ROTOTILLER saves time, speeds construction by making sharp turns without taking tines from the ground or stopping machine.



● Here's the big-capacity SKILSAW you need for speed where heavy timbers replace steel in war construction! On aircraft and engine factories, on tank and armament plants, Model "127" SKILSAW speeds every cut that's called for! Saws up to 4 in. full . . . *saws 8x16's in two quick cuts* . . . rips, cross-cuts and bevels *fast!*

Extra-powered for extra-deep sawing, Model "127" SKILSAW is light and compact for easier handling . . . ruggedly built for longest trouble-free service. Ask your distributor for a demonstration of Model "127" SKILSAW *today!*



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(Continued from page 122)

up its duty as an electronic watchman.

The elevation of the upper end of the tunnel is approximately 350 ft. more than the lower end, resulting in about a 6 percent grade. During most of the year the "chimney effect" is such that the tunnel ventilates itself, so the ventilating fan runs only in case of unusually dense traffic.

System Practically Trouble-Free

When the automatic traffic control was first placed in service, trouble was encountered when boys placed a board in front of the photo-electric relays to give extra counts and thus tie up traffic. A few hours in the Bingham jail for these boys soon eliminated this source of trouble. Aside from the usual small troubles, the automatic traffic control has worked quite satisfactorily. After three years of continuous service, with hundreds of thousands of operations, only minor repair parts have been required. Approximately 600 cars go through the tunnel every 24 hr. with each one causing two operations of the equipment.

★ ★ ★

Blasting TIPS FOR CONTRACTORS

(Continued from page 60)

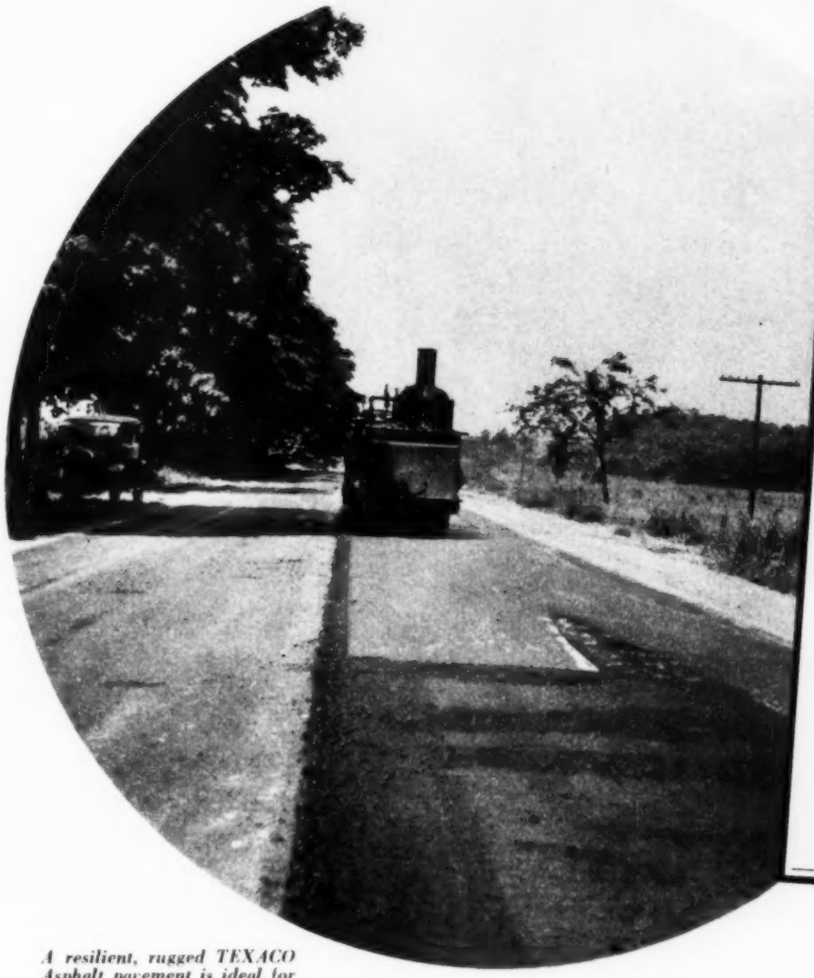
tins next, and ammonia dynamites are the least waterproof. Nevertheless, ammonia dynamites are suitable and most economical for comparatively dry or merely damp work.

Fumes

It is an axiom that in any underground work there will be some noxious fumes from the explosives. All dynamites produce some noxious gases. But since dynamites vary greatly in their fume qualities, care should be used in the choice of explosives. There are jobs where fumes should be considered, but where it is not necessary to use explosives with the best fume qualities.

Dynamites with the best fume qualities, that is, the least objectionable fumes, are the gelatins and semi-gelatins. Gelatins, however, are higher priced explosives. Therefore, semi-

(Continued on page 126)



ACCESS ROADS *that help beat the* AXIS

A resilient, rugged TEXACO Asphalt pavement is ideal for service on "access roads".

"Access roads" are vital links in the war effort . . . one speeds the movement of repair parts and gasoline into a Navy flying field . . . another carries food and munitions swiftly into an Army training camp . . . over a third, raw materials and finished products shuttle into and out of a humming war plant.

These vital "access roads" must deliver swift, safe and uninterrupted transportation into airport, camp and war plant. They must be able to stand up under hard usage with a minimum of maintenance, because repairs interfere with traffic.

As insurance that "access roads" will play their part in maintaining the pace of the war effort, pave them with TEXACO Asphalt, using the plant-mix or penetration macadam method. Under all kinds of traffic for a third-of-a-century, these heavy-duty types of TEXACO construction have won general recognition for durability and low upkeep. Hundreds of miles serve heavily-travelled State highways from the Atlantic to the Rockies.

TEXACO engineers, specialists in Asphalt street, highway and airport construction, are at your service.

THE TEXAS COMPANY, Asphalt Sales Dept., 135 East 42nd St., New York City

Boston Philadelphia Richmond Chicago Houston Jacksonville

TEXACO REG. T. M.

TEXACO ASPHALT

LANDING STRIPS RUSH!

Building the vastly expanded network of auxiliary airports—emergency landing fields and strips—required for our tremendous national aviation training and development program was, and still is, a vitally important —"RUSH"— war assignment.

On scores of such projects Cleaver-Brooks Tank Car Heaters and Bituminous Boosters were on the job — heating and pumping the oils and bituminous materials as rapidly as needed on the job.

Write for complete information describing this equipment.

CLEAVER-BROOKS COMPANY
5125 N. 33rd Street, Milwaukee, U.S.A.

Cleaver Portable Pumping Booster as used in airport and military road construction.

CLEAVER-BROOKS TANK CAR HEATERS... BITUMINOUS BOOSTERS... AUTOMATIC STEAM PLANTS

It's got something on the ball!

27 sizes with 4-hole head; 15, sizes with ratchet head. 8⅜ to 29¾" high, 2 to 19½" lift, 5 to 30-tons capacity.

Self-leveling, drop forged cap "floats" on large chrome-molybdenum steel ball, reducing friction 88%. Safety peephole in unbreakable malleable iron base prevents over-extension of screw. Not just a screw jack—it's a Simplex Jack.

Templeton, Kenly & Company, Chicago

Better, Safer Jacks Since 1899

Make Your Jacks Last Longer!

Proper lubrication, care and handling will do it. Send for a bulletin on the care of jacks.

Simplex LEVER · SCREW · HYDRAULIC Jacks

(Continued from page 124)

gelatins should be used wherever they can pull the burden.

Delay Blasting Caps

We recommend use of delay electric blasting caps in preference to instantaneous electric blasting caps hooked in several series or caps with varying lengths of fuse. Even though delay caps are expensive, economies they introduce will save the contractor money in the end. The advantage of delays is that the shooter does not have to wait for smoke to clear before going in to shoot the second string of shots. This saves the shooter's time and advances drilling and shooting work considerably.

There is also an important safety advantage in using delay caps. The old practice, unfortunately still followed in some places, of using instantaneous caps and loading the second round of holes at the same time as the first is dangerous. The second round may be propagated by the first, or the dynamite may be ignited by the heat of the explosion of the first round and detonate while the blaster goes in to connect the wires for the second round.

Mudcapping

Mudcapping, wherein one or more sticks of dynamite are simply placed on top of the boulder with a cap of mud plastered over the sticks and shot with a fuse or electric cap, is a good way to bring in a flood of complaints from the neighborhood about the noise and concussion. Further, the practice is wasteful. It is usually cheaper to drill the rock and load a much smaller quantity of dynamite. Only in an emergency, where it is necessary to get a boulder out of the way of a shovel, and then only if the area is uninhabited should mudcapping be done.

Blasting Mats

Blasting mats often are needed in explosives work, particularly in sewer construction in city streets near buildings. Heavy mats are made expressly for this purpose of hemp rope, steel wire rope or chains. These, however, are expensive, and where the contractor does not anticipate much use for them he can use substitutes which will serve for the occasional shot. Heavy planks, crossties, logs or brush will serve admirably if handled properly. Planks or logs should be roped or chained together and if possible filled in with brush to keep small particles from flying out between the planks.

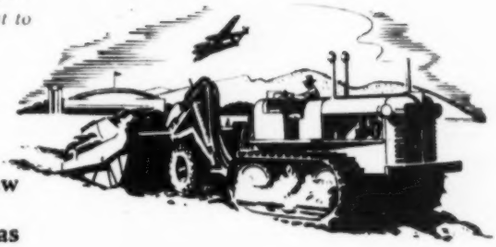
For blasting a stump close to a building a method known as "crimping"

(Continued on page 128)

RAILROADING CROSSES A NEW FRONTIER

Today on the Great Northern, GM Diesel Locomotives *like this are hauling heavy war loads through "The Great West." On one mountain operation, consisting chiefly of movement of metal vital to victory, the utilization of GM freight locomotives resulted in an increase of 30% in train hauling capacity.*

Here Currier and Ives, the famous portrayers of American life of the past century, depict one of the great eras of railroading – the achievement of rail transportation from East to West – the opening up of new lands and unexploited resources.



Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-the-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.

WARS have a way of ending old eras and starting new ones. Following the Peace of 1865, the nation was first united from coast to coast by bands of steel (May 10, 1869). Geographically, America has no new frontiers. Technically we have many. The curtain already has been drawn back on one element of the new era that surely will follow the present conflict—a new tool for the improvement of national transportation—General Motors locomotives.

GM
GENERAL MOTORS
DIESEL POWER

LOCOMOTIVES.....ELECTRO-MOTIVE DIVISION, La Grange, Ill.

ENGINES..150 to 2000 H.P...CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

ENGINES.....15 to 250 H.P.....DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

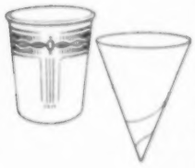
HOW TO HELP KEEP YOUR

MEN AT WORK!

A lot of today's sick-absenteeism starts with a sore throat or cold. Easily caught illnesses can spread through a group of workers through carelessness in the supplying of drinking water. The outlawed water bucket and dipper, passed from mouth to mouth, was a contagion carrier.

The modern water boy takes water to workers with a Dixie Portable Water carrier, serving each man with an individual paper cup. No danger of infection . . . used but once, these cups are then disposed of.

The Dixie Portable Water Carrier saves important time . . . for the men do not have to leave their work for water.



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Dixie and Vortex paper cups are made at Easton, Pa., Chicago, Ill., Darlington, S. C., and Toronto, Canada.

DIXIE CUPS

ONE OF THE VITAL HEALTH DEFENSES OF AMERICA-AT-WAR

(Continued from page 126)

may be used consisting of an improvised mat of logs or railroad ties stacked over the stump in the form of a teepee. A chain is looped loosely about each log to allow some play when the blast goes off. The stump, when shot, will rise only a few feet in the air and settle back into the hole. The only precaution needed is to make sure there is no stratum of rock which will carry the vibration directly to a nearby building and perhaps rattle the dishes.

Fill Settlement

In fill settlement work and ditch blasting the most efficient means of putting down a large number of holes is a problem. In wet soils an ordinary bar may serve, but in sandy soil or in sand under muck, the hole sometimes fills up before the dynamite can be loaded. The Ashley core punch bar can be used to drive a hole through sand, the shell serving to keep the hole clear until the dynamite has been loaded. Even this method can be speeded up, where the tools are available, by using water jets to wash out the sand. Jets greatly speed the loading, but raise loading costs considerably over the simple bar or the core punch bar.

Of interest to contractors is the extending use of dynamite for fill settlement work. Use of dynamite in settling highway fills has spread now into many states where it has hastened settlement and saved money by preventing damage to the paved highway from subsequent settling. This method, however, has other applications which are not generally recognized. It can be used for foundations built on soft ground. With factory sites in large cities becoming more scarce, it is likely that some ground discarded because it was unstable may now be used if an economical method of fill settlement can be found. Dynamite would be equally as good in foundation work as in the settlement of highway fills.

Misfires

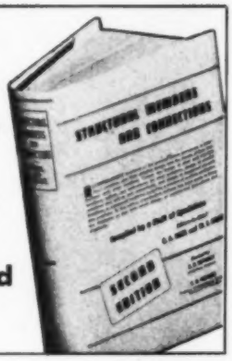
Any misfire is puzzling when the loading and connections have been carried out carefully, but one type which usually occurs in wet work is particularly mystifying. Sometimes the center holes in a blast connected in series will fail to go, while the holes on each end will fire. Tests have shown that this failure occurs where the holes are wet and the ground water is alkaline or contains mineral matter in solution and failure is likely to happen when more than 50 caps are connected in series, regardless of the amount of current used.

Because of the high conductivity

(Continued on page 130)

The latest technical know-how

on design of structural members and connections



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NEWARK, N. J. **SINCE 1870** TOLEDO, O.
WRITE FOR THE NAME OF THE DEALER NEAR YOU

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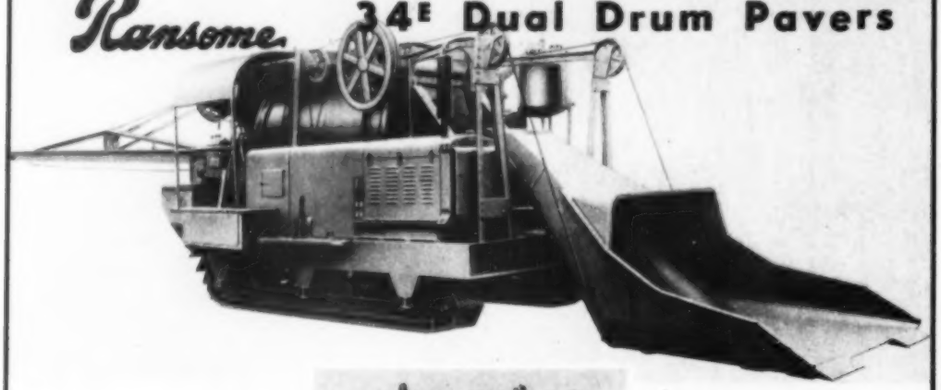
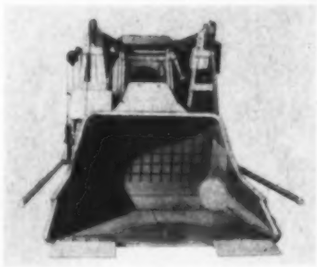


Advantages of RANSOME *Skip*



- Wide, deep skip with smooth flow lines is thoroughly reinforced on bottom. Has no sharp corners or pockets.
- Grate prevents foreign matter, such as cement bags, timbers, etc., from entering drum.
- Skip pivot bearings designed to permit loading skip on uneven ground surface without damage.
- Skip floor and throat lined with high carbon steel liners.
- Spring bumper prevents damaging skip when discharging into drum.
- Self-equalizing hoist cable provides against cable overloading.

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Here's Your Engine!

Machine designing engineers, contractors, farmers, oil operators and industrial users are more and more recognizing the amazing versatility, heavy-duty dependability, fit-the-machine compactness, light weight and economy of WISCONSIN AIR-COOLED ENGINES. Specify these engines for *today's* work as well as for *tomorrow's* applications.

Power range: 1 to 31 hp., 1 and 4-cylinder types. Model VE-4, 22 hp., 4-cylinder V-type illustrated.

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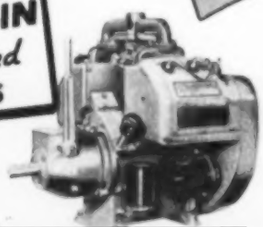

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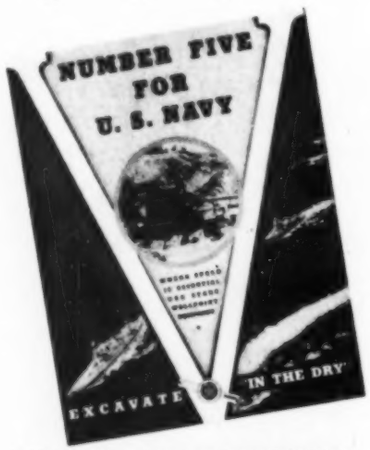

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(Continued from page 128)

of the soil water, some current leaks from the cap wires at one end, pass around the center holes and return to the cap wires at the other end. Caps in the center, receiving less current than those at the ends, fail to explode. The remedy is to use electric blasting caps with enameled wires or with wires of equal protection against current leakage.

Users of explosives should be, and mostly are, familiar with precautions which should be taken in the event of misfires. Investigations which should be made have been fairly well explained by most explosives manufacturers, but the primary precaution is to wait for several hours and if possible until the next day before approaching the charge.

Damage Suits

Relations with the public wherever explosives are involved have vexed contractors just as they have vexed the explosives manufacturers themselves. Contractors are apt to run into more difficulties than the manufacturers, because manufacturers, through years of experience, have been able to confine their work to districts where there is a minimum of annoyance and no danger to any person except those directly handling the explosive. Almost any kind of construction job, however, may be carried on in close proximity to the public, which seldom welcomes the use of explosives.

Proper technique in their work has saved contractors trouble and money in handling the complaints and lawsuits which often follow construction jobs in urban areas.

First step in avoiding damage claims is to have in charge of the blasting competent men who will conduct the work with no negligence. If the contractor can prove there was no negligence, his case is half won, while if the plaintiff proves there was negligence, the contractor is almost certain to pay a damage claim. Beyond this the contractor should always use the smallest amount of explosive which will do the work.

Even if these precautions have been taken, the contractor may be open to a suit which will cost him thousands of dollars. Damage suits almost always are tried after the work is completed and obviously always after the alleged damage has been done. Hence, unless the contractor knows the condition of the damaged building prior to the blasting, he is forced to take the plaintiff's word that damage occurred after the construction job blasting began.

To avoid this predicament, every contractor on a job of any size should

(Continued on page 132)

HOW AND WHY
WILLIAMS' TOOLS AID WAR PRODUCTION

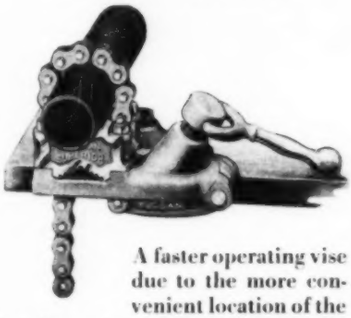
DATA ON "VULCAN" CHAIN PIPE VISES

● Williams' "Vulcan" Chain Pipe Vises are available in two basic types: "Vulcan Superior", with adjusting handle on top for greater convenience to the operator, and "Vulcan", of conventional design with handle below the base.

In addition, the Williams' line also includes the "Vulcan" Vise Stand —a complete unit combining Vise, Stand and Pipe Bender. A description of the construction and utility features of these Vises is given here to facilitate selection of the most efficient type for any specific service.

Williams' "VULCAN", *the original Chain Pipe Vise, is still the favorite among experienced pipe workers.*

"VULCAN SUPERIOR"

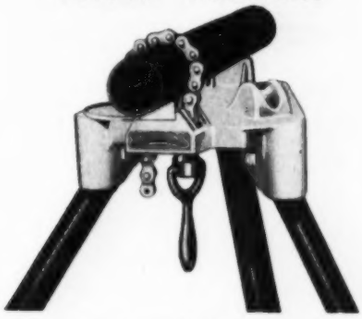


A faster operating vise due to the more convenient location of the handle on top of vise and above the bench. This vise also has reversible jaws, which double the service life of the tool. "Vulcan Superior" has one half inch larger capacity than other chain vises of corresponding size. Made entirely of tough wrought steel with drop-forged base, jaws, handle and chain arm. Available in two sizes, for pipe 1/8" to 4-1/2".

"VULCAN"

The original chain pipe vise and a favorite with pipe workers for more than thirty years. A light, compact, positive-gripping tool suitable for a wide variety of pipe work. Made entirely of wrought steel the same as "Vulcan Superior". Available in four sizes, for pipe 1/8" to 8".

"VULCAN" VISE STAND



A 3-in-1 unit combining Vise, Stand and Pipe Bender. The high-grade malleable iron base, designed for severe service, is equipped with oil can recess, tool slots, and rear pipe support. The Pipe Bender handles pipe up to 3/4". For easy carrying, legs fold and secure with tie chain. Vise parts are interchangeable with "Vulcan" No. 1. Made in one size only, for pipe 1/8" to 2".

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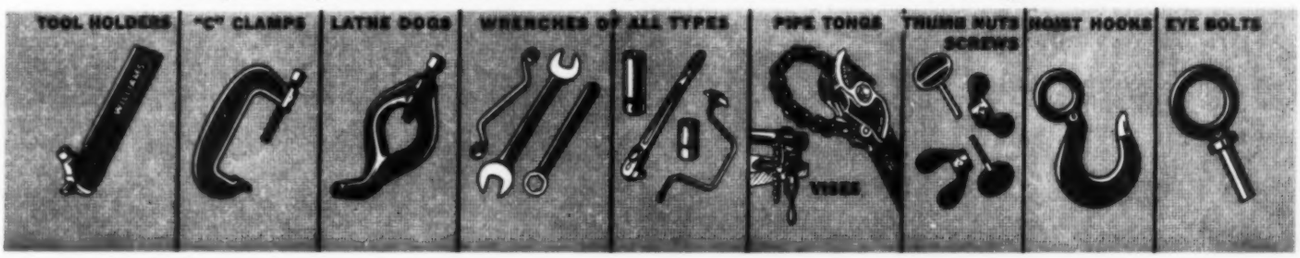

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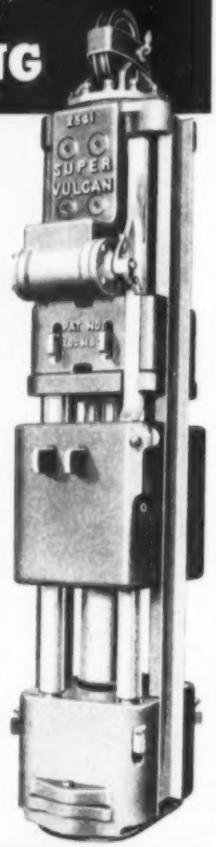
Speed Up
THE PILE DRIVING



The pile hammer shown here is a Super-Vulcan Open Type Available in Sizes 18c, 30c, 50c, 80c

This widely used pile hammer fits the same leads and uses the same accessories as the Vulcan Single-Acting Pile Hammers. This type too has been used for years—it delivers a moderate frequency of low velocity blows from a relatively heavy ram.

Get that important initial speed — get more piles down faster in such construction as for docks, industrial buildings, bomber plants, power plants, bridges. Write for bulletins.

VULCAN IRON WORKS Since 1852
331 North Bell Avenue
Chicago Illinois

(Continued from page 130)

have a qualified engineer examine all buildings adjoining or abutting on the street where the work is to be carried out. Photographs should be taken of all existing damage to prove the state of the structure before work started. If a wall is in perfect condition, of course, there is no purpose in photographing it. But the foundation, walls, general character of the building, and any faults whatsoever, should be examined and photographed.

These precautions have saved many a contractor money and often forestalled suits. Testimony of a qualified engineer and photographs are the best evidence that can be presented in court.

In a big job it is well also to have a recording instrument to obtain permanent record of the vibration caused by each blast. The falling pin test, although sometimes admissible in court as an indication of the vibration, is not a quantitative measure and therefore not nearly such good evidence as a permanent record.

★ ★ ★

POST-WAR JOBS

(Continued from page 56)

by the Turner Construction Co. and alluding to the production record made by business management and its employees in support of our country's battle for the preservation of world freedom, the letter concludes with the following two brief paragraphs:

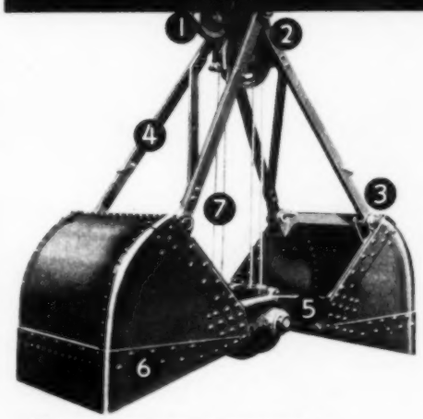
"In this great drive for production and more production, greater emphasis than ever is being placed on efficient methods. It is our belief that much will be learned during the present period. In the post-war period, instead of finding our country overbuilt, there will be many opportunities where business will wish to modernize its plants and equipment to keep abreast of the competitive world. Farsighted industrialists will not wait for the post-war period to make such investigations.

"We shall be glad to give you the benefit of our experience, particularly in cost studies that may be essential to you."

Brief, pointed letters of this kind have been effective in producing a number of inquiries from industrial and commercial concerns which are now working with the Turner organ-

(Continued on page 134)

SEVEN FACTS IT WILL PAY YOU TO KNOW ABOUT BROWNHOIST BUCKETS



1. 5 to 22% larger sheaves lengthen rope life.
2. Underslung top block lowers center of gravity.
3. Extra large cover-bracket bearing easily lubricated.
4. Well-braced, forged Bail Bars give extra strength.
5. Annealed cast steel closing arms increase digging efficiency.
6. Heavy carbon-steel sharpened digging lips (with or without teeth) provide efficient digging.
7. Cables last longer by being kept from contact with material.

Write today for complete catalog of Brownhoist rope reeve, power wheel, special purpose, open type grab, link-type buckets.

INDUSTRIAL BROWNHOIST
BAY CITY, MICH. • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

National
Carbide
Floodlights
VALUABLE IN PEACETIME
A NECESSITY NOW

FOR ALL PURPOSES WHERE FLOODLIGHTS ARE REQUIRED.

Simple In Construction
Economical In Cost
Dependable In Operation

Available in 1500, 8,000 and 16,000 candlepower units.

Write today for literature showing entire lines of Floodlights and Lanterns.

NC 200

NATIONAL CARBIDE CORPORATION
60 E. 42nd St., New York, N. Y.

ASHORE and AFLOAT G-B COUPLINGS and FITTINGS SAVE MAN-HOURS

Two great industries are brought together in this picture of a ship launching in the midst of an oil field. Together also are oil men and ship builders when it comes to the question of speed, safety and savings in making pipe assemblies. Both use thousands and thousands of G-B Rolagrip Pipe Couplings and G-B Segweld Pipe Fittings in order to—

1 To permit use of plain end pipe, thereby saving costly threading, flanging or grooving operations which waste millions of man-hours.

2 To simplify and speed up installation. Rolagrip Couplings, with only three parts to position and two bolts to tighten, afford the simplest, fastest method of joining pipe.

3 To get a permanent, leak-tight seal of the many different types of pipe lines vital to oil field and ship operation.

4 To get safe, strong, yet flexible pipe connections. Tight-gripping Rolagrip Couplings allow for controlled movement to compensate for expansion, contraction and deflection.

5 To save weight and retain pipe strength. Rolagrip Couplings give greater strength with less weight. They permit use of lightweight pipe. Because they are applied to plain end pipe, weakening of pipe wall by threading or grooving is avoided.

Subject to priority ratings, relatively fast shipping schedules are being maintained on both Rolagrip Couplings and Segweld Pipe Fittings. In case your pipe stock has grooved ends, we can supply G-B Gruvagrip Pipe Couplings.

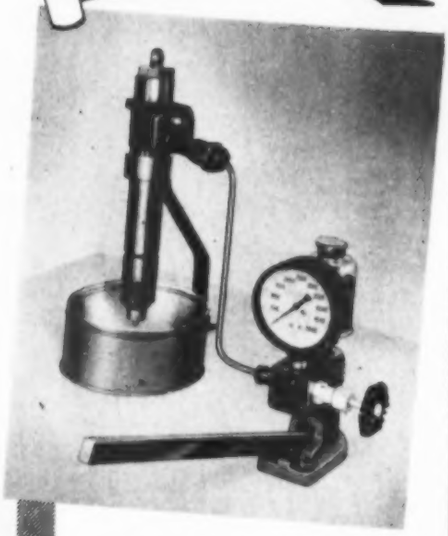
Precision Made
G-B SEGWELD
FITTINGS
New, varied pitch welding bevel, cut on automatic machines, and double welding in precision jigs have revolutionized pipe fittings. Supplied with plain, threaded, grooved or flanged ends — galvanized, cadmium or lacquer finishes.

G-B MFG CO

GUSTIN-BACON MFG. CO.
KANSAS CITY, MO.
Chicago • New York • San Francisco • Tulsa • Ft. Worth • Houston

ROLAGRIP
PIPE COUPLINGS FOR PLAIN END PIPE

ADECO
NOZZLE TESTER
FOR DIESEL ENGINES



VITAL FOR MAINTENANCE

PORTABLE . . . EASY TO USE . . . KEEPS DIESELS AT PEAK PERFORMANCE

With this advanced-type, portable diesel nozzle tester, any mechanic can make quick, accurate tests of injector opening pressure, spray pattern, stuck needle valves and leakage around valve seats. Compact, light in weight and precision-built, the Adeco Tester checks all makes and sizes of injectors—on bench or engine—at pressures up to 10,000 p.s.i. Avoids costly delays and possible damage to injector tips. Keeps diesels operating at peak efficiency.

Write for new illustrated "Know-How" bulletin describing this Adeco unit—America's most widely used nozzle tester.

AIRCRAFT & DIESEL EQUIPMENT CORPORATION
4401 NORTH RAVENSWOOD AVE.
CHICAGO, ILLINOIS

(Continued from page 132)

ization on plans for post-war construction.

What An Owner Asks a Builder

Almost without exception, the companies asking Turner for advice wish to depend on their own knowledge for plant layout and building dimensions. Advice of the building firm ordinarily is requested on the ultimate cost dependent upon structural features: foundations, frame, walls, roof, floor, windows, doors, insulation, stairs, and means of ingress and egress for employees and freight. Nearly all the owners request similar information and advice on permanent mechanical installations: heating, ventilating, power supply, artificial lighting, fire prevention systems, plumbing, water supply and water lines, and other utilities such as steam and compressed air systems, where needed. Based on the decisions regarding these features, the builder is able to supply an answer to the owner's fundamental question: "What will be the estimated cost of the proposed plant?" Usually the builder is asked also to supply comparative costs of less expensive plants which might satisfy the owner's needs.

Classifying Post-War Possibilities

Broadly speaking, company executives separate business concerns into three groups in relation to prospective construction after the war. One class will have been heavily engaged in war production and will possess enlarged plant of modern design, financed by either private or Government funds. These concerns will be seeking markets for products to be made in the new plants and may wish to sell their older, less efficient buildings. Companies in this class will be poor prospects for post-war construction.

A second large group will comprise companies which have not fitted into the war production program. These concerns will be meeting peace-time competition of companies possessing modern plants, and it will be advisable and perhaps compulsory for them to improve their productive facilities if they are to survive.

A third class includes the large group of companies which have been forced to postpone needed improvements because of war restrictions. The railroads are a good example of this condition. Both of the latter groups offer good opportunities for post-war construction.

What One Manufacturer Wants

The casket manufacturer mentioned in the company's list of post-war prospects may be classified in either of the latter two categories. Because of restrictions on metal, his

(Continued on page 136)

Which do you prefer for degreasing repair parts . . .

HOT or COLD solutions?

Whether you clean motor blocks, transmissions, carburetors and other automotive parts with HOT or COLD solutions before repair, you'll find you can speedily, thoroughly remove dirt, oil and grease . . . make inspections, repairs, reassemblies and adjustments more easily . . . simply by using

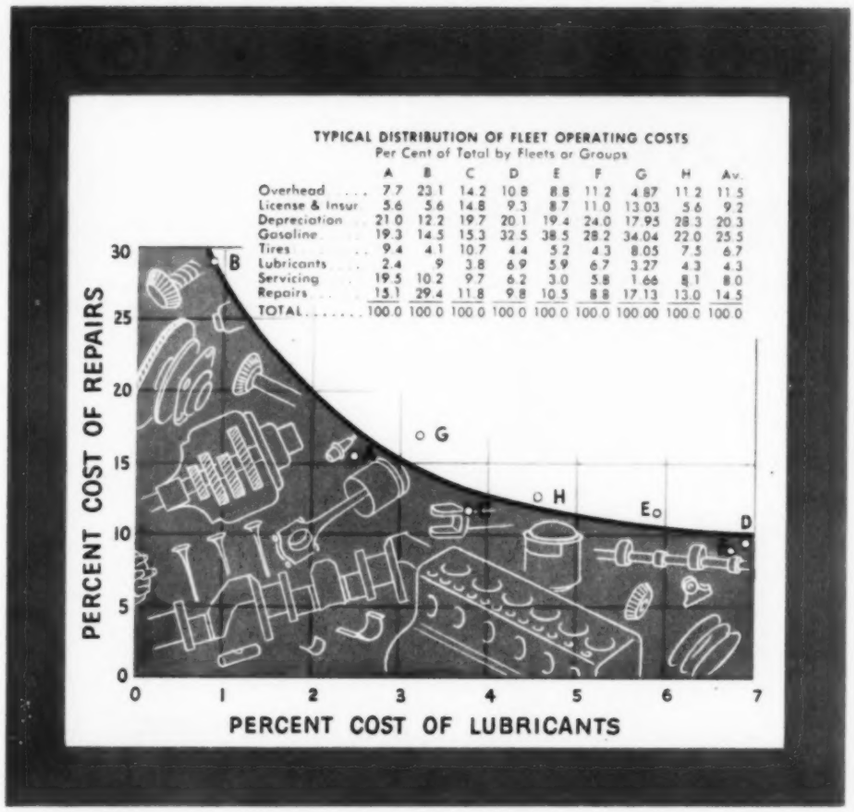
OAKITE MATERIALS

These SAFE, fast-working alkaline and emulsifying solvent materials, specially designed for hot tank degreasing and cold tank cleaning, provide dependable results that HELP YOU speed servicing and reduce maintenance costs. Write for FREE booklet giving FULL details.

OAKITE PRODUCTS, INC.
24G Thames Street, NEW YORK, N. Y.

UNION
PILE HAMMERS
'They can take it'

EST. 1900
Union Iron Works, Inc.
ELIZABETH, New Jersey



KEY

- **A** Oil Co. Survey of Several Fleets, Av.
- **B** Large Public Utility Fleet
- **C** Scattered Fleet of 400 Vehicles
- **D** Scattered Fleet of 500 Coupes
- **E** Scattered Fleet of 450 Cars
- **F** Fleet of 500 Half-Ton Pickups
- **G** Autocar Company's Report (Adjusted)
- **H** "Composite" Iowa Automobile Costs

How to save scarce parts and labor

• GRAPHIC EVIDENCE that scarce parts and labor can be saved by good lubricants is given in the chart above. It represents the experience of many fleets, as shown by the table. Note that in practically all instances, fleets that spent more for lubricants had lower repair expense—also a much lower total of lubricants plus repair costs than the other fleets.

That was important, even in normal times. But today, with repair parts and labor both hard to get, the cost of lubricants is even less important. The only question is, "How much will it save on maintenance?"

Doesn't that suggest the first step to take in your preventive maintenance plan? Find out exactly what your costs are for repairs and for lubricants. Then work toward adopting lubricants that will lower the total of *both*.

Here's how a Standard Oil Man can help you. He can recommend lubricants that will help reduce wheel bearing maintenance and chassis repairs, or motor oils that will eliminate troublesome varnish and engine deposits. From his experience with these products on other fleets, he can help you save both scarce parts and labor. Call any local Standard Oil (Indiana) office, or write 910 S. Michigan Ave., Chicago, Ill. In Nebraska, call any Standard Oil Company of Nebraska office.

Start saving with one of these detergent-type oxidation-inhibited motor oils.

Stanolube H. D. This heavy-duty oil for gasoline and Diesel engines is available only to the U. S. Government and fleet operators. It represents our most advanced development in an oxidation-inhibited, detergent-type oil for protection against varnish, engine deposits, and the resultant overhaul and maintenance expense.

Standard Bus and Truck Oil. Designed for moderately heavy-duty service in gasoline or Diesel-powered trucks and buses where its detergency and oxidation-inhibited quality assures cleaner engine operation than can be obtained with conventional type motor oils.

A Standard Oil representative can advise you which of these war-duty oils is best fitted for your equipment.

Oil is ammunition . . . Use it wisely

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ **FLEET CONSERVATION SERVICE**

Reduced Costs
One Reason for 50,000,000 sq.ft. of
VACUUM PROCESSED FLOORS
4
4
3
2
1
1. Screeding freshly placed concrete.
2. VACUUM mats pulling out excess mixing water. Hose manifold is connected to truck-mounted VACUUM pump.
3. Floating follows mats as they move ahead.
4. Troweling may be started within 30 minutes after placing – when VACUUM is used.

With construction jobs becoming highly competitive, the Vacuum Process* offers you numerous advantages which may not only help you *secure the contracts* you bid on . . . but also enable you to *realize the profits* to which you are entitled. Here are some of the savings made possible by the Vacuum Concrete Process:

a. MORE ECONOMICAL MIX – Saving up to 2¢ per sq. ft. of slab.

b. NO DUST COAT OR "DRIER" NEEDED – Vacuum removes free water . . . saves up to ½¢ per sq. ft.

c. LESS FINISHING TIME – Savings in many cases range from 1¢ per sq. ft. in Summer to 1½¢ in Winter.

d. FORM ECONOMY – Figure on 3-day stripping the year 'round.

e. EASIER PLACING – Engineers permit use of greater slump when excess water is subsequently removed by Vacuum processing . . . saving 4 to 10 men in placing gang.

f. FASTER – By concreting to 5 P.M. instead of 1:30 on a recent cold weather job, contractor cut ½ from estimated concreting time . . . saved 1½ months.

g. NO CAPITAL TIED UP – Vacuum Process equipment is furnished on reasonable rental basis . . . when and where you need it . . . with full-time supervisor at no extra cost to train your men and insure maximum benefits.

VACUUM CONCRETE, Inc.
4208 SANSOM ST. PHILADELPHIA, PA.

*PROCESS AND EQUIPMENT PATENTED U. S. & FOREIGN COUNTRIES

Vacuum Concrete Process
Removes Excess Water from Freshly Placed Concrete
FOR SPEED AND ECONOMY *Plus* GREATER STRENGTH

(Continued from page 134)

business has had to swing over to use of other materials. After the peace, he looks forward to making metal caskets, but he realizes that his production process in the present plant is inefficient and uneconomical. The company occupies a multi-story building, and the process starts at the bottom and finishes at the top, instead of the more economical reverse procedure. The manufacturer wants to build a new plant, designed by his engineers and architects for efficient production.

Future Effect of War Plants

Government-financed war plants present a puzzle which the company's executives face squarely in their consideration of post-war construction. The disposition of these plants after the war is an unknown factor which can seriously influence the volume of construction, particularly by private owners. Recently reported opinions by Government officials ranging from President Roosevelt to Jesse Jones, chairman of the RFC, and William L. Batt, vice chairman of WPB, indicate that these plants may be sold to their present operators under an equitable arrangement which will not give them too much of an advantage over their competitors. If private industry is permitted to use the plants for productive purposes, their higher efficiency may be expected to lead to the retirement, sale or scrapping of the operating companies' older, obsolete plants. As a second result, competitors probably will be compelled to build new plants of equal or greater efficiency in order to maintain their competitive standing.

Regardless of the manner in which the new plants may be disposed of, the Government and the public hardly will allow their great wealth-producing capacity to be wasted by standing idle. Their effect, therefore, is almost sure to be the building of equally efficient plants by competitive producers. Many multi-story plants now in use probably will want to transfer their processes into single-story buildings adapted to low-cost line-production methods.

Relations With Engineers and Architects

As can be seen from what already has been said, the picture of post-war prospects for the Turner Construction Co. has been brightened by intelligent effort to develop potential business. On the basis of its long experience, the company stands staunchly in favor of separation of the functions of engineer, architect and builder. Independent thinking by the three agents for the owner is believed to produce the best results.

In making studies for post-war

(Continued on page 138)

PARSONS

● *The offset boom feature makes operations between bank and pavement elementary. The heavy section alloy steel buckets with drop forge alloy steel teeth stand up remarkably well.*

TRENCHERS Quickly House Productioneers

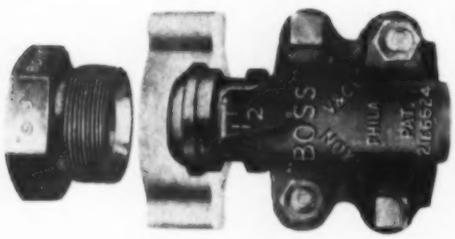
With a Parsons Trencher, one machine covers the entire project...yes, lateral and service lines alike. That's why Parsons gets the important housing jobs. Trenches must be dug faster, because our vast army of laborers to industry need their defense homes. Furthermore, these trenches for drainage and other service facilities must be completed prior to building the homes. With the speed and rigidness for which Parsons is known, their trenchers can accept these assignments throughout the world, in any climate... hot or cold, in any soils from .... clay or shale ... to loam or gumbo. With a speed variation unequalled, Parsons Trenchers deliver greater output plus quality work. Parsons' speed can do more work, and Parsons' quality equipment lasts longer. See your Parsons' dealer today or write him now for detailed information.

THE PARSONS COMPANY · NEWTON, IOWA

TRENCHING EQUIPMENT PARSONS

Tough . . . Yet Refined!

Yes . . . "BOSS" Couplings are tough . . . husky enough to withstand the highest pressures, highest temperatures and *roughest handling* required on any job. Yet with all their brute strength, they have refinements of design, threading and finish that assure easy coupling and uncoupling, and other requisites to faultless service. They have been setting the pace for coupling performance for over a quarter of a century.



"GJ-BOSS" Ground Joint

FEMALE HOSE COUPLING, STYLE X-34

The *washerless* coupling for steam, air and hydraulic hose. Ground Joint construction provides soft-to-hard metal seal that will not leak, regardless of wear or presence of abrasive particles. Powerful grip of "BOSS" Offset Interlocking Clamp precludes all danger of blow-offs. Swivel Wing Nut permits quick coupling and uncoupling. Sizes: ½" to 4", inclusive.

"BOSS" Male Coupling

STYLE MX-16

Built to insure safe, reliable service on steam, air, and liquid hose lines. Exceptionally strong and durable. More convenient and economical than standard I.P.T. nipples, as each size fits same size hose. Can be quickly reset on the job. Companion to "GJ-BOSS" and "Boss" Female Couplings. Sizes: ¼" to 4", inclusive.

Stocked by Manufacturers and Jobbers of Mechanical Rubber Goods

DIXON
VALVE & COUPLING CO.
MAIN OFFICE AND FACTORY: PHILADELPHIA
BRANCHES: CHICAGO • BIRMINGHAM • LOS ANGELES • HOUSTON

(Continued from page 136)

construction, it is felt that the attention of architects, engineers and builders may well be directed towards furnishing more efficient service to the owner. This improved efficiency may be brought about by closer cooperation among architects, engineers and builders in the early stages of planning for each job, when first decisions are being made and the first lines are being put on the drawings.

Professional Influence on Post-War Developments

From the builder's point of view traditional etiquette and professional ethics of the architects and engineers appear to handicap the professional men in doing their part to stimulate immediate planning for post-war construction. A re-orientation of the true meaning of professional ethics seems to be in order if the engineer and architect are to exert their proper influence upon private owners and government agencies to encourage prompt preparation of plans for sound construction of post-war projects.

Employment Now for Versatile Contractors

To take up the slack in employment of contractors' personnel in the immediate future, it is suggested that the versatile training and management ability of construction organizations fit them to take contracts to manage and operate war production plants now being completed.

★ ★ ★

All-Wood Ammunition Igloos

(Continued from page 61)

Army last year made use of an alternate beehive construction (*Construction Methods*, June, 1942) and now, as the final material-saving step, an igloo has been designed entirely of non-critical materials.

Dowelled interlocking joints fasten the members into a strong seven-sided arch which is mounted on a concrete foundation. The igloos, measuring 40 ft. in length, 9⅔ ft. high with a 20-ft. span, are placed at widely spaced intervals as a protection against large-scale damage by explosion. Waterproofing is done with alternate layers of roofing paper and

HOISTS

STEAM • ELECTRIC
GASOLINE • DIESEL
AND
BELT DRIVEN

- FOR OVER 69 YEARS WE HAVE BEEN BUILDING FINE HOISTING MACHINERY
- OUR DUPLICATE PART SYSTEM INSURES PROPER FIT OF OUR FACTORY BUILT REPLACEMENTS
- FOR THE DEFENSE AND OFFENSE WAR EFFORT KEEP YOUR PRESENT HOIST IN GOOD WORKING CONDITION

We can help you!

We proudly fly these flags

LIDGERWOOD
Established 1873
MANUFACTURING COMPANY
Main Office and Works ELIZABETH, NEW JERSEY

GRIFFIN

GRIFFIN

WELLPOINT SYSTEMS

JETTING PUMPS

FOR SALE RENT

Prompt Shipments

Send for our New 60 page illustrated catalog

"GRIFFIN POINTED WELLPOINT FACTS" chock full of latest information on Wellpoint Systems for dewatering, emergency and permanent water supply systems, also information on pressure pumps and data for jetting.

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"E" FOR EXCELLENCE

in production of the tools that safeguard the accuracy of American Industry

We, at The Lufkin Rule Company, are proud to have received the Army-Navy Production Award in recognition of the quality and quantity of precision measuring tools we have produced. Scarcely a single part of the vast supply of war equipment America today is producing can be made without the aid of precision tools, measuring tapes or rules.

In accepting this award, we pledge ourselves to ever greater production efforts until final and complete victory has been achieved.

LUFKIN

PRECISION TOOLS
TAPES • RULES

SAGINAW, MICHIGAN
NEW YORK CITY

asbestos fiber coating. Strutting holds the crown in position until backfill is put in, giving sufficient side pressure to make the arch self-supporting. After the igloos have been constructed they are covered with backfill that is finished by fine-grading and seeding, leaving only the ventilator and tunnel entrance exposed.

★ ★ ★

Last Gap Closed

In Canada Highway

(Continued from page 66)

snows prohibited highway traffic in that section for the winter, was the last river bridged, the last rock outcrop shattered, the last mile surfaced with gravel.

Highway of Modern Design

Although it will be sometime in the future before pavement is laid, the highway in other respects is of modern design. The roadbed itself is 30 ft. wide while the width of the right-of-way is 200 ft. Through swamp and muskeg sections, parallel side ditches were excavated and hedge rows of trees averaging 30 ft. in width were left standing as a screen between the ditches and roadway. Side slopes of both cuts and fills are 2:1 or flatter and have been seeded with grass to prevent erosion as sod for this purpose would have to be imported at excessive cost. With the exception of one point, a railway grade crossing near Hearst, no curve exceeds 2 deg. and no grade exceeds 5 per cent. Tangents are long and the minimum sight distance of 1,000 ft. was freely extended up to 1,800 ft. to fit the gently rolling nature of the terrain.

Bridges and Culverts

Two insurmountable conditions, shortage of steel and impracticability of transporting heavy materials to sites of bridges and culverts, governed the type of structures. As a result, all but three of the larger structures were constructed from native timber, cut and framed at portable sawmills set up along the route. The bridges, which will later be replaced by steel ones, have been offset from the center line so that traffic will not interfere with construction of the permanent structures.

Along with the job's inaccessibility and the unusual weather conditions, the type of terrain and its effect upon

(Continued on page 140)

On the front lines of war-time construction all over the world, CMC equipment has been getting the jobs done. Yes, CMC Mixers, Pumps, Hoists, saws, Carts and Barrows have joined the Army, Navy and Marines, and will be remembered for their ability to STAND UP AND TAKE IT under the punishing service of the greatest construction program in the history of mankind.

CONSTRUCTION MACHINERY COMPANY
WATERLOO, IOWA

MIXERS • PUMPS • HOISTS
BATCHING & PLACING EQUIP.
SAWS • CARTS • BARROWS

Keep ahead of Schedule with GATKE High-Heat-Resisting

Asbestos BRAKE MATERIALS

How do GATKE Brake Materials speed operations and save money? They keep operating and avoid delays. They pick up and release with smooth, positive, non-grabbing action for faster operation—require fewer adjustments.

GATKE Brake Materials are engineered and service proved for every brake and clutch of Excavating, Road Building and Construction Equipment. Just tell us what you need!

GATKE Brake Blocks and Frictions

Disc Type Clutch Facings

Cone Type Clutch Facings

GATKE MAKES
Brake Lining
Clutch Facings
Frictions
Non-Metallic Bearings
Sheet Packing

GATKE CORPORATION
226 N. LaSalle St. Chicago

Here Is Your Nearest Worthington Distributor

For Sales, Rentals and Service on BLUE BRUTE Portable Compressors, Rock Drills and Air Tools. Get your EQUIPMENT-SAVER — FREE see full page ad on Back Cover

ALABAMA
Birmingham—Tractor & Equipment Co.
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Phoenix — Smith Booth Usher Company
ARKANSAS—Fort Smith — R. A. Young & Son
Little Rock — R. A. Young & Son
CALIFORNIA
Los Angeles — Smith Booth Usher Company
San Francisco—Edward F. Hale Company
COLORADO
Boulder — Standard Machine Works
CONNECTICUT
Hartford — The Holmes-Talcott Company
GEORGIA
Atlanta — Tractor & Machinery Co., Inc.
ILLINOIS — Chicago — Kennedy-Cochran Co.
Rock Island — Western Equipment & Supply Co.
INDIANA
Indianapolis — Reid-Holcomb Company
IOWA — Des Moines — Electrical Eng. & Constr. Co.
KENTUCKY — Harlan — Hall Equipment Sales
Louisville — Williams Tractor Company
LOUISIANA
New Orleans — Wm. F. Surgi Equipment Company
MAINE — Ellsworth — Murray Machinery Co.
MARYLAND
Baltimore — D. C. Elphinstone, Inc.
MASSACHUSETTS
Boston — P. I. Perkins Company
Cambridge — W. W. Field & Son, Inc.
Springfield — The Holmes-Talcott Company
MICHIGAN
Detroit — W. H. Anderson Company, Inc.
MINNESOTA
Hibbing—Arrowhead Equipment & Supply Co.
Minneapolis — The George T. Ryan Company
MISSOURI
Kansas City — Machinery & Supplies Company
MONTANA — Helena — Caird Engineering Works
NEW HAMPSHIRE
West Lebanon—P. I. Perkins Company
NEW JERSEY
Irvington — Smith Tractor & Equip. Co., Inc.
NEW MEXICO
Albuquerque — The Harry Cornelius Company
NEW YORK
Albany — Larkin Equipment Company
Albany—T. Southworth Tractor & Machy. Co., Inc.
Menands
Binghamton — MacDougall Equipment Co.
Buffalo — Dow & Company, Inc.
Corona, L. I. — The Jaeger-Lembo Machine Corp.
Middleton — S. T. Randall, Inc.
New York—Hubbard & Floyd, Inc.
Olean — Freeborn Equipment Company
Oneonta — L. P. Butts, Inc.
Syracuse — Harrod Equipment Company
NORTH CAROLINA
Durham — Constructors Supply Company, Inc.
OHIO — Cincinnati — The Finn Equipment Company
Cleveland — Gibson-Stewart Company
Marietta — Northwest Supply & Equipment Co.
Toledo — M. W. Kilcorse & Company
OKLAHOMA
Oklahoma City — Townsco Equipment Co.
OREGON
Portland — Andrews Equipment Service
PENNSYLVANIA
Easton — Sears & Bowers
Harrisburg — N. A. Coulter
Oil City — Freeborn Equipment Company
Philadelphia — Metalweld, Inc.
Pittsburgh — John McC. Latimer Company
Wilkes-Barre — Ensminger & Company
SOUTH CAROLINA
Columbia — Bell-Lott Road Machinery Co.
SOUTH DAKOTA
Sioux Falls — Empire Equipment Co.
TENNESSEE
Chattanooga — James Supply Company
Knoxville—Wilson-Weesner-Wilkinson Co.
Memphis — Tri-State Equipment Company
TEXAS — Dallas — Shaw Equipment Company
Houston — McCall Tractor & Equipment Co.
San Antonio — Patten Machinery Company
VIRGINIA
Richmond — Highway Machinery & Supply Co.
WASHINGTON
Seattle — Star Machinery Company
Spokane—Andrews Equipment Service
WEST VIRGINIA
Fairmont — Interstate Engineers & Constructors
WISCONSIN
Eau Claire — Bradford Machinery Company
Green Bay — Nelson Machinery Company
Madison — Western Equipment Company
WYOMING
Cheyenne — Wilson Equipment & Supply Co.

Get more WORTH from air with WORTHINGTON

Buy Blue Brutes

Worthington Pump and Machinery Corp.

(Continued from page 139)

the equipment presented problems not usually associated with such work. Although there were rock sections, the long stretches of muskeg encountered on every contract not only posed the problem of spoil disposal but, along with scarcity of suitable fill material, limited the use of mechanical scrapers. As a result, most of the grading, aggregating more than 13,000,000 cu. yds. of excavation, was done by power shovels, draglines and trucks. At peak operations, heavy equipment employed totalled 65 power shovels and draglines, 30 scrapers and 50 tractors. A labor force of about 4,000 men was employed.

How Muskeg Was Handled

Method of handling the muskeg varied according to its depth. Where the muskeg on the center line was not more than 2 or 3 ft. deep, it was pushed aside by a bulldozer; when from 2 to 12 ft., it was excavated 30 ft. wide, the muskeg standing at vertical slopes, and the material deposited in spoil-banks on each side of the excavated channel. In depths of more than 12 ft., it was removed by blasting, using the overfill and undershooting method. Explosives were placed in the muskeg across the 30-ft. width, and sufficient fill was placed on the surface to hold the muck down and cause it to be displaced sideways when the explosives were detonated, usually by propagation. Explosives were used in but few places since depth of the muskeg usually ran from 4 to 8 ft.

After backfilling operations were completed and the roadbed brought to grade, the excavated muskeg was flattened down to form a long slope from the roadbed shoulder to the clearing line. Since this material is highly porous when dry, this method of treatment not only solved the muck disposal problem, but will provide insulation against frost penetration into sides of the fill.

Clearing and Grubbing

As the country was heavily timbered, burning of trees cut from the right-of-way presented a serious fire hazard. Although each contract had a resident fire ranger to supervise all burning operations, and fire-fighting equipment was available, sudden squalls would scatter embers starting many small fires. All, however, were kept under control. Disposal of stumps from grubbing operation presented many difficulties as these were unburnable without several months' exposure. As it was impossible to find

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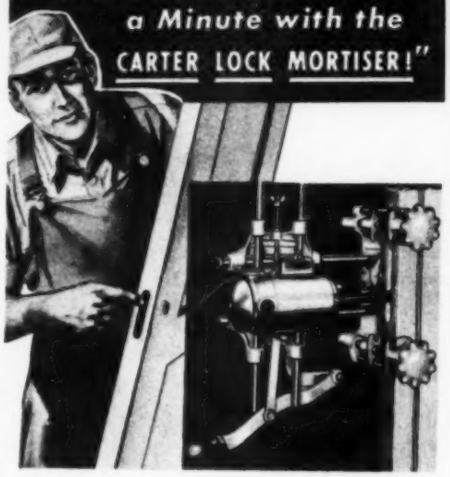

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sufficient piling space off the right-of-way, they had to be stacked high by mechanical means to interfere as little as possible with grading operations.

Finally there was the problem of obtaining suitable fill material. Sand and gravel deposits were few and widely scattered and access roads to these pits had to be built through bush and muskeg. For this reason most of the movement of fill material was done by trucking.

While at the moment of great military significance, completion of this 153-mi. road is more important as the final link in Canada's first coast-to-coast highway, a highway that has been designated as Canada's "Main Street."

★ ★ ★

Making Big Ones Out of Little Ones

(Continued from page 51)

an inner tank about 7 ft. in diameter and 40 ft. deep. An annular space about 2 ft. wide surrounds this tank, between the inner and outer walls. Against the outer wall is an 8-in. asbestos insulating layer. Between the insulation and the inner steel wall are twelve vertical steel channels supporting 24 electric heating elements about 30 ft. long hooked up in three banks of three, nine and twelve for variable temperature control. A Brown Instrument Co. temperature control apparatus maintains the tar at any temperature for which the device is set and records the temperature continuously on a circular graph.

Administration

Design of the second supply main and refabrication of smaller pipe into large sizes have been under the direction of Elbert E. Lochridge, chief engineer, Springfield, Mass., Municipal Water Works, assisted by James B. Porter, associate water engineer. William R. Conard, Burlington, N. J., is inspecting engineer for the water department on both fabrication and laying of the pipe.

Methods of refabricating large-diameter pipe from smaller sizes were worked out by the Walsh Holyoke Steam Boiler Works, Inc. Holyoke, Mass., under the supervision of Louis Beauregard, manager, and Alphonse A. Beauregard, superintendent. Vincent P. Marran is president of the company.

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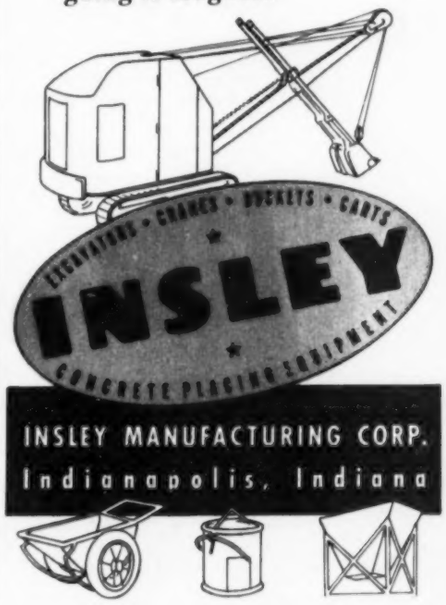

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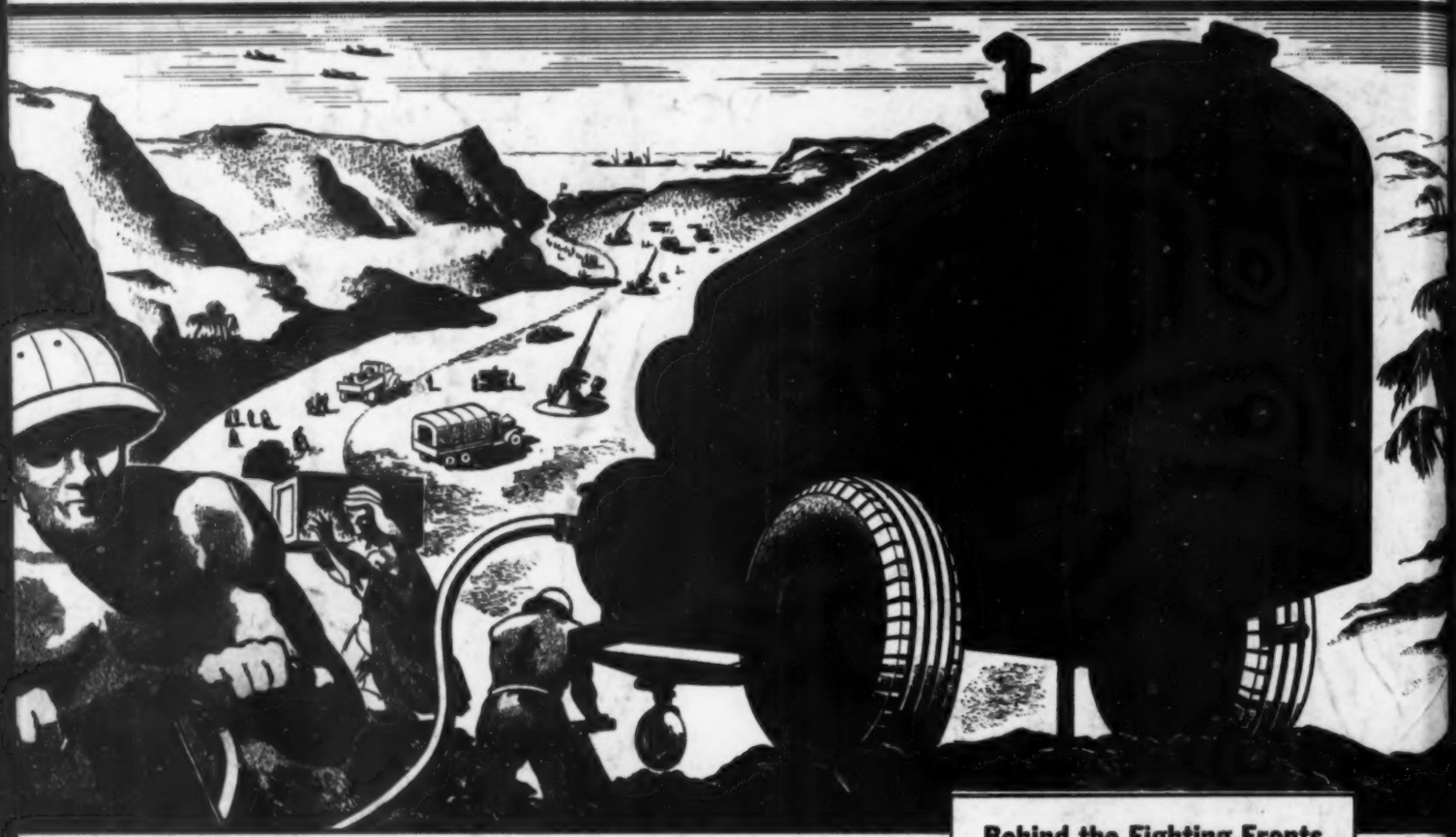

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